THE MARINE REVIEW

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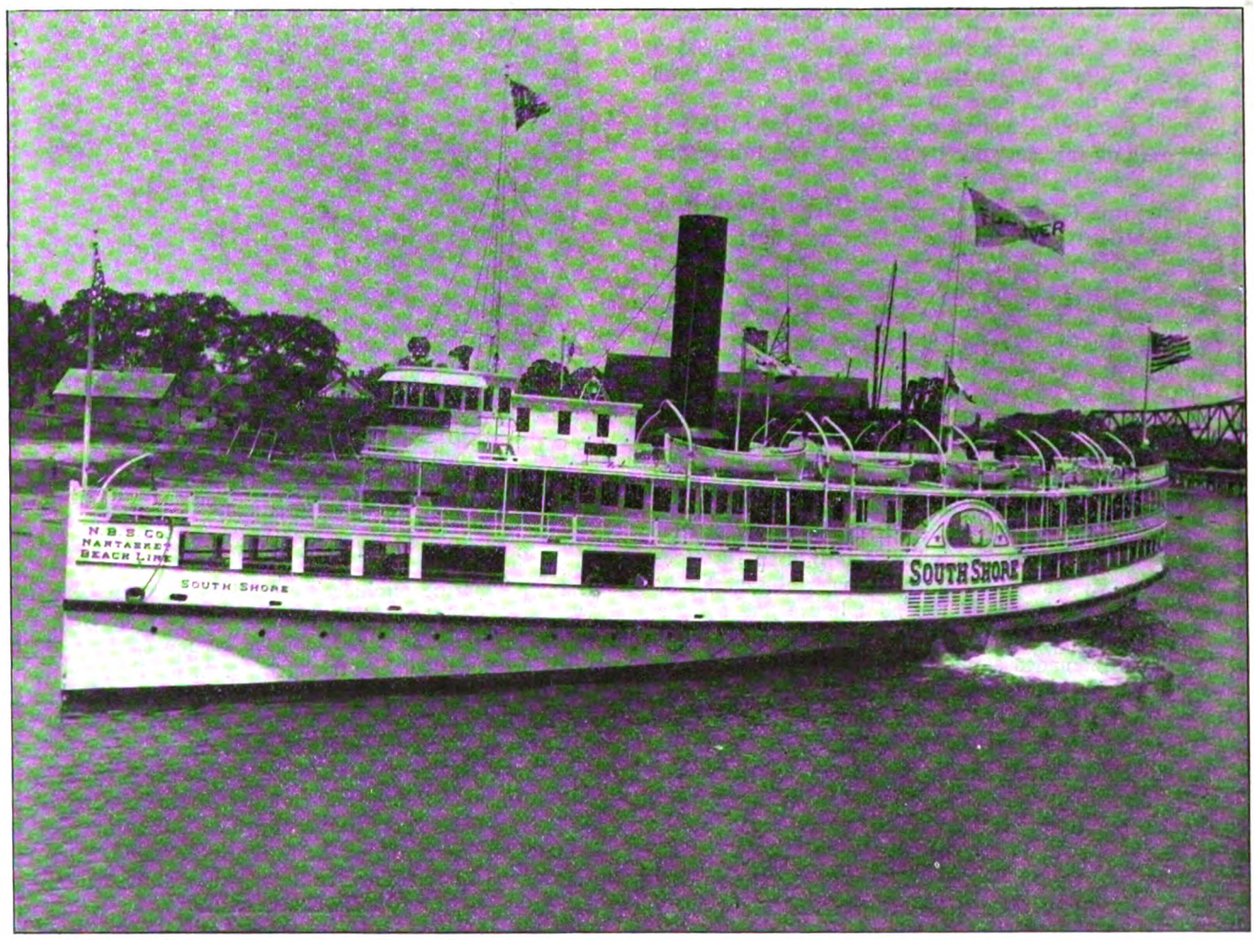
EXCURSION STEAMER SOUTH SHORE.

The Fore River Ship Building Co., Quincy, Mass., has just delivered to the Nantasket Beach Steamboat Co. the new steel paddle-wheel excursion steamer South Shore. The new steamer has been built of mild steel throughout and is of the following dimensions:

Length over all, 205 ft. 6 in.; length between perpendiculars, 200 ft.; breadth over guards, 56 ft.; breadth molded, 32 ft. 6 in.; depth molded, 12 ft.; extreme depth to top of dome, 33 ft. The vessel has been constructed with four decks, viz.: lower, main, saloon and hurricane decks, the three last named being carried out to the extreme width of the vessel affording great deck area for saloon accommodations and promenading. On the lower deck forward sleeping quarters are arranged for the crew and firemen, also storerooms and steering engine compartment. Aft a spacious officers' dining room has been fitted up, with crew's mess room and kitchen, and at the extreme after end cabins for officers and stewards. Leading from this deck to the main deck there are three large stairways.



EXCURSION STEAMER SOUTH SHORE OF THE NANTASKET BEACH STEAMBOAT CO.'S FLEET.
Built by the Fore River Ship Building Co., Quincy, Mass.

The main deck forward is bulkheaded off to form freight space, with large gangways opening into same. Abaft these and abreast of the boiler casing, wing houses are built containing men's toilet and lavatory arrangements, on the starboard side, and on the port side crew's wash room, lamp room, storeroom and check room, while amidships a large lunch room has been built with hinged shutters

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opening on three sides. In the midship portion of the vessel on this deck a neatly paneled wood casing has been arranged around the engine hatch and the deck itself carried with an easy slope over the paddle shaft, which is a considerable improvement on the older method of forming a step and thereby causing a dangerous stumbling block in the passage ways. After wing houses adjoining paddle box have been arranged for the first mate and chief engineer. Outside of the saloon enclosure proper the after main deck saloon has been arranged in three compartments, all of them well lighted by large sliding windows. Forward the quarter deck compartment is handsomely fitted up with mahogany dado and paneled sides finished in white and gold with artistic frieze. At each side there are spacious mahogany stairways leading to the saloon deck over. Immediately after these spaces ladies' cabin is located fitted with olive colored plush sofas and finished in a similar manner to the quarter deck enclosure. At the extreme end of the house ladies' lavatories, etc., have been arranged. There is ample walking space around this house on the outside, with deck lights arranged underneath the seats for lighting officers' quarters on the lower deck.

The saloon deck extends for about seven-eighths of the entire length of the vessel and has a paneled deck house for about half this length, lighted by large sliding windows and upholstered, with cane bottomed chairs arranged around the sides in groups, and in center line. This saloon will provide those passengers with shelter from wind and sun who do not care to avail themselves of the promenade outside. On each side at the forward end of paddle boxes on this deck the purser's room and director's room are located.

The hurricane deck is built on top of the saloon deck house for half its length and has a large well-lighted dome supplying light and air to the saloon below. Arranged around the after end are slat seats and at the forward end there is a commodious house fitted up as captain's, pilot's, mate's and quartermaster's cabins with pilot house at the extreme end of these. Ten life boats are stowed on this deck with facilities for handling them rapidly in case of emergency.

The propelling machinery consists of one set of compound diagonal surface condensing engines supplied with steam by two large boilers, the installation aggregating 1,200 H. P., which will give the vessel a speed of about 15 miles per hour. The South Shore is lighted throughout by electricity and in addition a powerful searchlight has been mounted on top of the pilot house and a number of large deck lights arranged in the open for illuminating the promenades at night.

Altogether the vessel is a notable addition to the already large fleet of the Nantasket Steamboat Co. With her great accommodations, modern methods of construction and the ample conveniences provided for the comfort of the passengers the South Shore should prove one of the best and most popular excursion vessels on the Atlantic coast.

Everything the forethought could suggest with a view of insuring the safety of the passengers has been incorporated on this vessel, comprising life boat, life raft and life belt, capacity to take the entire complement of 2,300 people. Numerous hydrants with their attendant hose lengths have been arranged in easily accessible locations and most important of all a more minute sub-division of the steel hull than has been hitherto attempted in this class of vessel, so that in the event of a collision the vessel's buoyancy will be interfered with to a minimum. It is well within the bounds of moderation to assert that this vessel in equipment, design and construction is probably an advance over any vessel at present plying in these waters.

MR. J. B. HAYWARD.

Mr. J. B. Hayward, who has just been appointed assistant local inspector of boilers for the Cleveland district, has been identified with the marine engineering fraternity for the past sixteen years. He received his first training in marine work at the Globe Iron Works, Cleveland. After working at the Globe shops for three years he started oiling on the steamer Northern King and the following season was second engineer on the steamer Continental of the Republic Iron Mining Co.'s fleet. He

MR. J. B. HAYWARD.

followed marine engineering until 1904 when he entered the service of the Fidelity & Casualty Co., of New York, as boiler inspector for Michigan, headquarters at Detroit. Just previous to his engagement with the Fidelity & Casualty Co., he was chief engineer of the steamer Sir Henry Bessemer, belonging to the Pittsburg Steamship Co.'s fleet. The steamers Sir William Fairbairn and Robert Fulton belonging to the fleet of the Bessemer Steamship Co. and since purchased by the Pittsburg Steamship Co., were brought out by him. Mr. Hayward has been a member of the Marine Engineer's Beneficial Association, of Cleveland, since he began work as an engineer.

The steamer Merida and the schooner Antrim, both of the Gilchrist fleet, were in collision at the head of the lakes and seriously damaged. The Merida was leaving the Missabe dock and the Antrim was being towed to the dock by two tugs. The vessels collided just north of the Interstate bridge. The bulwarks on the port bow of the steamer were stove in and several plates on the port bow of the Antrim were broken. Temporary repairs were made.

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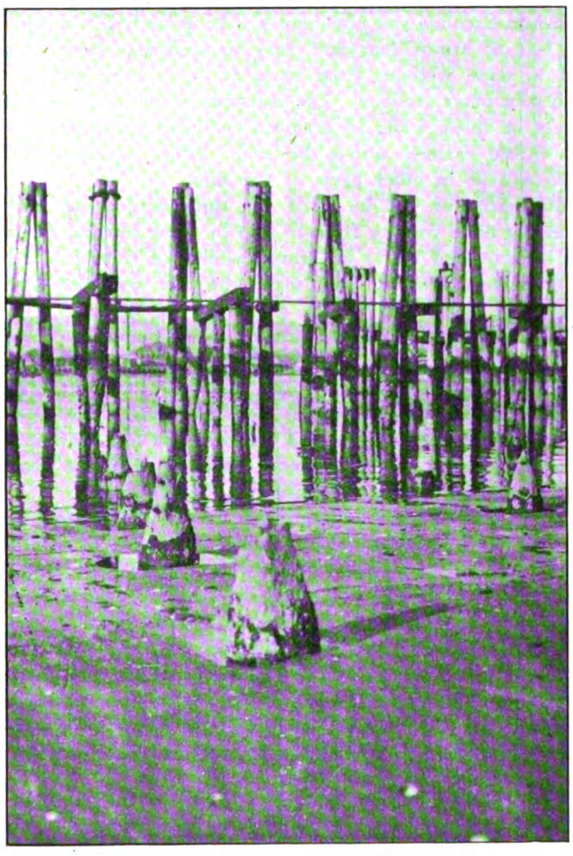
PILES EATEN BY TEREDOS.

These pictures which were taken at Seattle, Oakland and San Francisco by Frank B. Gilbreth, of New York, during the latter part of April shows creosoted piles that are very badly eaten by teredos and limnoria and offer striking evidence of the necessity of concrete piles to



SHOWING GENERAL EFFECT ON PILING.

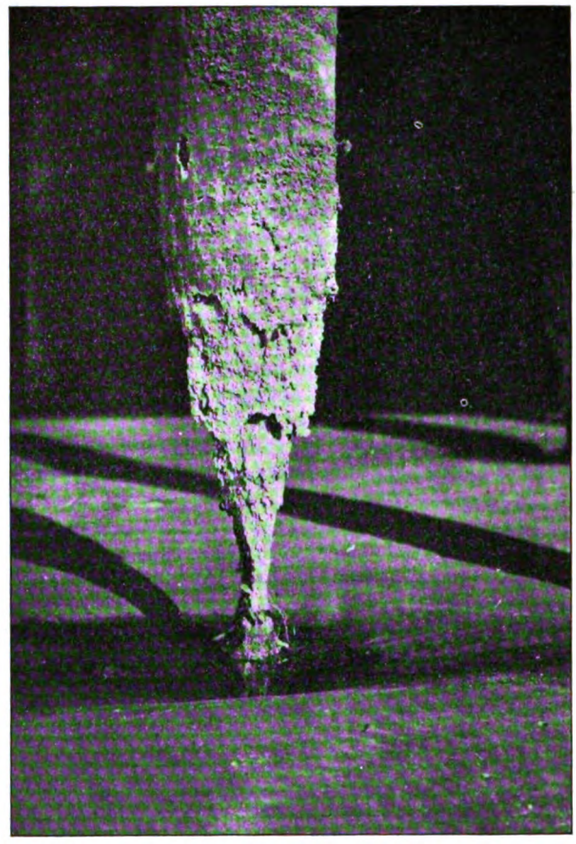
replace wooden structures. In the vicinity of Puget Sound according to Mr. Stewart, who is assistant chief engineer of the Great Northern railroad, a stick of timber, rough sawed, will last about eight months, a peeled pile

PILING EATEN BY WORMS.

will last a year, a pile with the bark on will last a year and a half while a creosoted pile will last from 15 months upwards, and the unfortunate part of it is that two piles treated and driven under the same conditions will be affected differently by the teredo and limnoria.

ANGLO-AMERICAN POLAR EXPEDITION.

On the evening of May 20, the schooner Duchess of Bedford, set sail from Victoria, B. C., with the Anglo-American expedition party on board. The head of the expedition is Captain Ejnar Mikkelsen, a Dane, who has been a member of two previous Arctic exploring parties;



UNDERWATER CORROSION CAUSED BY WORMS.

he is accompanied by Ernest de K. Leffingwell, a Chicago geologist, who was with Mikkelsen in the Baldwin expedition; Ejnar Ditlevsen, a Danish Arctic explorer; George Howe, a Harvard zoologist; and a crew of seven men. Ernest Stefalssen, of Harvard, is already on his way to Herschel island, where he will be joined by the party on August 20. The main object of the explorers is to discover the edge of the continental shelf and a chain of islands which, it is believed extend from Banks Land and Patrick island on the east, along the parallel of 76° to the longitude of Urangel island in Alaska. Ernest Stefalssen is a well-known ethnologist and Ejnar Ditlevsen, of Copenhagen, is a naturalist. Both will make scientific observations.

Prof. George Davidson, of the United States coast survey, president of the Geographical Society of the Pacific, in his annual report points out that this region has been pretty well traversed by American whalers since the discovery of Urangel island by Captain Long in 1867, which was an unusually open season. Captain McKinnon, cruising to the north of Point Barrow, reached 74° and had a sharp horizon extending in every direction. To the north he perceived the "loom of land" and would have penetrated into higher latitude had not a shift of wind compelled him to return, through fear that a north wind might drive him into the ice-pack. The land sighted by McKinnon is marked on some maps.

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Captain P. H. Ray, of the United States army remained in the extreme north for two winters and three summers, and gathered strong evidence of the existence of undiscovered land in Beaufort sea. In the spring he saw eider ducks flying from the shore toward the northeast, presumably to their breeding-grounds. In autumn the birds returned in bad condition; the conclusion being that they must have been breeding on some unknown land.

The schooner Duchess of Bedford is a sailing vessel of 66 tons burden, having a length of 67½ ft., a beam of 18½ ft., and a depth of 7½ ft. She is built of camphorwood, the outside planking being of quaki-wood, sheeted ious points through the ice. When the season opens, they are three heavy beams in the hold to prevent the vessel from being crushed in an ice-pack. She has accommodations for seven men aft and four forward.

Mr. Leffingwell will go down the McKenzie river and expects to reach the Arctic ocean about the middle of July. The Duchess of Bedford will sail from British Columbia to Kabiak island and thence to the east coast of Siberia, along which Captain Mikkelsen will cruise, picking up dogs, of which he intends to secure sixty. In August he will pass through Behring straits into the Arctic ocean, getting in close to the shore of Alaska, as the vessel is of light draught. At Point Barrow a station will be established and tidal observations made. Captain Mikkelsen's plan is to join Mr. Leffingwell on August 20 at the mouth of the McKenzie river. The whole party will proceed easterly to Cape Bathurst and will cross thence to Prince of Wales island. Winter quarters will be made in an Eskimo village at Minto inlet. In the spring of 1907 two men will go to Melville island and thence to Prince Patrick island, making soundings at varwith gum-wood. The bow is plated with iron and there will cross to Nelson's head, along the coast of Bank's island to Barnett bay, where the provisions will be taken ashore and the schooner Duchess of Bedford will leave the explorers, returning herself to Victoria, B. C. In the spring of 1908, the party, provisioned for 140 days (the provisions being already packed in sealed cases), will start out with two dog teams in a northwesterly direction over the ice, keeping on their course until the soundings indicate that the edge of the continental shelf has been passed. If land is encountered, the party will travel along it while the provisions last, killing some of the dogs as food for the others when the supplies to be hauled diminish.

SOUTH CAROLINA AND MICHIGAN.

The navy department has made public the chief characteristics of the battleships South Carolina and Michigan, bids for the construction of which will be opened at Washington in about three weeks. It was the intention of the department to open bids for these vessels, which are to be, for their tonnage, the most powerful ever constructed for the United States navy, next Friday, but owing to the inability of the Union Iron Works of San Francisco to get in its bid by the specified time, on account of the earthquake, the opening of the bids was deferred three weeks. The new battleships, which must displace on their trial trips more than 16,000 tons, will be 450 ft. long, with an extreme breadth at the water line of 80 feet and 2½ in., while the mean draught to bottom of keel at the time of trial displacement must not exceed 24.6 feet. The armament plans call for a main battery of eight 12-in. breech loading rifles, and two submerged torpedo tubes, while the secondary battery is to consist of twenty-two 3-in. rapid fire guns, two 3-pounder semi-automatic guns, eight 1-pounder semi-automatics, two 3-in. field pieces, and four machine guns of .30 calibre.

The 12-in. guns, of which the new ships will carry twice as many as are on board any American vessel now in commission or building, are to be mounted in pairs, in four electrically controlled, elliptical turrets, each with an arc of fire of 270 degrees, two turrets being forward and two aft. The guns of the secondary battery will be placed in commanding positions, and are to have large unobstructed arcs of fire. The torpedo tubes will be installed forward. The hulls of the South Carolina and Michigan will be protected by a waterline belt of armor that will vary in thickness from 12 to 8 in. in some sections, from 10 to 12 in. in some and from 11 to 9 in other sections. The casemate armor is to be from 8 to 10 in. thick, while an armored bulkhead ten inches thick will extend entirely across the ship. Other armored bulkheads will be in other parts of the ship.

Four barbettes will be fitted, the thickness of the armor protecting them varying from 10 to 8 in. The conning towers will be protected by 12 in. armor, while the turrets will be armored with a 12 in. front plate, the rear and side plates to be 8 in. thick, and the top plates 2½ in. thick.

The ammunition will be carried in magazine and shell rooms, so placed that one-half of the total supply of ammunition will be carried forward and the other half aft. The handling rooms will be isolated from the turrets, the twelve and three inch ammunition and the torpedos and war heads to be transported on trolleys and tracks fitted in the magazines, handling rooms, passages and shell rooms.

The engines of the new battleships are to have a combined indicated horsepower of 16,500, each engine to be in separate water-tight compartment. The twelve water-tube boilers, which are to be fitted with superheaters, will be in three water-tight compartments, and the coal bunkers are to have a maximum capacity of about 2,200 tons. All the main compartments below the gun deck will be provided with forced ventilation, the combined capacity of the seventeen blowers being not less than 100,000 cubic feet per minute. The accommodations are to be sufficient to accommodate 51 officers and 878 men.

TWO IMMENSE PIERS COMPLETED.

The two new mammoth wharves built at San Francisco for the Pacific Mail Steamship Co., and officially known as piers No. 42 and 44, have just been formally accepted by the state harbor commissioners from the contractors, Nealy, Tibbitts & Co. These piers have, without any formalities, been turned over to the use of the Pacific Mail Steamship Co. These docks are the largest and best on the water front and represent a cost to the state of California of nearly $400,000. They adjoin the present old mail docks on the south, at the foot of Second street, and the approaches lead out over a a wide stretch of filled ground intervening between terra firma and the new sea wall, where the wharves have their shore ends. Railroad tracks run on the outer edge of the wharves on rails laid several feet below the floor, thus enabling trains to be loaded or discharged with a minimum of labor.

Every watchman, wheelman, mate and master on the lakes should read Clarence E. Long's article on "Scientific Lake Navigation" now running in the MARINE REVIEW. This series began in the issue of April 5. To anyone sending in his subscription now all the back numbers will be sent to him free—that is to say his subscription will be entered for one full year from the date of receipt and all the back numbers allowed without charge.

The passenger steamer Currie Ryerson was in collision with the steamer Georgia of the Goodrich line at Muskegon last week. The Ryerson was later beached in six feet of water.

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DRY DOCK DEWEY IN SUEZ CANAL.

The bulletin published by the Suez Canal Co. gives interesting details of the passing of the American floating dock Dewey from Port Said to Suez, and the difficulties that had to be overcome. This floating mass of a height of 65 ft. and an immersion of eight feet entered the canal on the morning of April 19, towed by the company's powerful tug, the Titan, assisted by the American steamers, the Caesar and the Potomoc. The United States government had informed the company that the draught of the dock would be about six feet, and special sidings had been excavated at kilometer posts 24 and 54 for the dock to enter and permit the ordinary traffic of steamers to be carried on. As they were found to be of insufficient depth, the dock had to moor on the Asiatic side of the canal at Port Said while additional dredging was effected, and it was only on the morning of the 27th that the transit began. The convoy, to which the company's tug Vigilant had been added, reached the post 24 (15 miles) in four hours and a half, with an easterly wind that compelled the dock to advance obliquely to prevent it from grounding on the African bank. Two gangs of workmen accompanied the convoy to remove the buoys and replace them if necessary. Their services were not, however, required during the first part of the passage as the buoys on each side are separated by a distance of 155 ft. With some few exceptions when touched they shifted, but remained attached to their moorings. The dock remained 12 hours at post 24 for ships to pass and left at two in the morning of the 28th, reaching post 54 in eight hours without incident. The wind had, however, then freshened, and some hawsers broke under the strain when an attempt was made to resume the transit. It was only on the 29th, at four in the afternoon, that the voyage could be resumed, and the convoy reached Lake Timsah at 9:30 in the evening. The voyage was continued at 11 the next morning, and at six in the evening the dock reached the Great Bitter lake, and moored off the South Light. With the next stage began the most difficult part of the operation. It comprised first the passage through the lesser lakes, in which the channel is marked throughout by fixed buoys, and in which the dock, being no longer supported by the bank to leeward was exposed to being driven by the wind onto the line of buoys. Danger was also to be apprehended from the influence of the currents which become sensible on nearing the Red sea. When the dock was started afresh at nine in the morning of May 1 a rather strong wind was blowing from the northwest. Driven by the breeze at an accelerated speed, the dock cleared the two bends of the small lake, demolishing the first buoy and breaking the lantern of the Pintsch buoy. At kilometer post 133 the dock sheered off and was carried athwart the channel, but labor for an hour was sufficient to right the craft and continue the voyage, the passage being again through the canal proper. The action of the current ahead was now fortunately neutralized by a wind aft, and the last part of the transit was accomplished at perhaps a more rapid speed than in the earlier stages. At five in the evening the floating mass entered the roads at Suez, after 107 hours spent in the canal, including 34 hours 29 mintues under way.

CIVIL ENGINEER AS BUREAU CHIEF.

(From the Army and Navy Register.)

The provision in the naval appropriation bill relating to selection of the successor to Rear Admiral M. T. Endicott, as chief of the bureau of yards and docks, in November when that officer goes on the retired list is evidently in the bill to stay. It was separated by Senator Hale from the companion provision relating to pay, on the theory that questions of personnel in particular should be the subject of what may be called an omnibus measure. It was the belief of the chairman of the senate naval committee that the naval bill should contain only what was absolutely necessary in the way of new legislation, and it was quite evident to everybody who has thought of the subject in a broad way that the eligibility of civil engineers for the bureau chiefship should be at once extended. This action has been taken by the senate naval committee after a full consideration of the questions involved and in proper appreciation of the important work accomplished during the last eight years in the bureau of yards and docks under the senior civil engineer, whose term of active service is drawing to a close. No arguments have yet been presented, and no reason is conceivable, for opposing the committee action. The provision as it stands ought to go through without hindrance. It is the assurance of efficiency. A civil engineer would have to do the work anyway and it would be better to give him the position and the power, along with the labor and the responsibility. It would be unjust to keep him in a subordinate place when he belongs at the head of the bureau.

AROUND THE WORLD UNDER JURY RIG.

The famous American clipper ship A. G. Ropes arrived at New York from Kobe, Japan, furnishing the first instance of a dismantled vessel crossing two seas under jury rig. The trip consumed nearly six months. For twenty-two years the time of the Ropes, which was built in Bath, Me., was posted in Hong Kong, San Francisco, Liverpool, Shanghai and this city for speed records in races half way around the world. She is 250 feet long and of 2,460 tons gross register, and is a full-rigged ship. While off Hong Kong last fall the Ropes was struck by a typhoon, and everything above the deck went by the board. When at the end of three days of suspense a German steamer appeared and offered for $3,000 to tow the Ropes to port, Capt. Rivers refused, although his report states that "it was some temptation to accept." He held out against exorbitant offers for towing until his ship was taken into port by a steamer for $500. This was not paid, however, until he had sailed for five days more with a sail rigged on the iron stump of the foremast. At Kobe the ship was sold at auction to Lewis Luckenback, of New York, and the nearly six months' voyage home under a makeshift rigging began.

GUN BOAT ALERT IN SERVICE.

The gunboat Alert has just been brought from Mare Island naval station down to San Francisco, and has been turned over to the California naval militia to be used as headquarters for the militia in San Francisco harbor in place of the old corvette, Marion. The latter vessel has done service as a school ship for the last seven or eight years. The old Marion will be returned to the government, be taken to Mare Island and probably be broken up. The Alert is a fine vessel for the naval militia, having six rapid fire 4-in. guns, four 6-pounders, and other good equipment. She will remain in the stream about a month, later going to a permanent anchorage off Sausalito. The Alert has accommodations for 150 men, who will receive their ordinary instructions in the National Guard armory in San Francisco, until the Alert is ready for their accommodation.

The German kaiser opened the Tetlow canal on June 2. This waterway cost $10,000,000 to build, is eight feet deep, and crossed by fifty bridges. It connects the manufacturing suburbs of Berlin with the sea via the Havel and Elbe canals.

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TRIAL OF EMPRESS OF IRELAND.

The twin-screw steamer Empress of Ireland, one of two vessels built by the Fairfield Ship Building & Engineering Co., Ltd., Glasgow, for the Canadian Pacific Railroad Co.'s new Atlantic service, ran her speed trials on the Clyde last week, and her full speed exceeded 20 knots. This result is of special significance, because of the condition that on limited dimensions the vessel was required to carry 6,500 tons of cargo on a mean draught of 27 ft. 6 in. This requirement was more than met, as the load on the draught was 6,900 tons, but the hull had to be designed on much fuller lines than is the case with high-speed craft generally, so that to exceed the guaranteed speed of 19¼ knots was a most satisfactory performance with the vessel loaded to her mean service draught. The quadruple-expansion engines, satisfactorily balanced to reduce vibration, developed over 18,000 I. H. P. when making 81 revolutions. There are six double-ended and three singe-ended boilers in the vessel, but so ample is the provision for steam generation that one of the latter was not in use at the trial. The vessel has a length of 550 ft. between perpendiculars and of 570 ft. over all; a breadth molded of 65 ft. six inches, and a depth molded of 48 ft., the gross tonnage being 14,155 tons. There is accommodation on board for 310 first, 468 second, 494 third, and 270 fourth-class passengers, besides a crew of 373, making 1,915 in all. In her arrangement and decoration the vessel afforded splendid indication of the progress of ship construction which marks each successive Atlantic ship, and many improvements in detail have been introduced as a result of the experience of Mr. Arthur Piers, the chief of the marine department of the Canadian Pacific railway, who was present at the trial. There were also present Dr. Francis Elgar, F. R. S., who designed the ship for the Canadian company, and Mr. Alexander Grakle, the managing director of the Fairfield company.

INTERNATIONAL MERCANTILE MARINE'S YEAR.

Although the report of the International Mercantile Marine Co. for the year ending Dec. 31, 1905, shows a decided improvement in income over the preceding year, still the earnings are small as compared with the enormous capital stock and bonded indebtedness of the company. The surplus for the year is given as $2,890,848, after deducting $236,643 for the "payment on account of trade agreement." The surplus, after special maintenance and appropriations, available for dividends, aggregates $890,848, or less than two per cent on the $51,730,970 preferred stock. Since its organization the company has accumulated a surplus of only $250,151, or about one-half of one per cent, on the preferred stock.

The statement for 1905 shows that $2,000,000 has been passed to the credit of the depreciation fund, the first evidence since the International Mercantile Marine Co. was organized that anything whatever had been set aside for maintenance, which, in the case of the ship building industry, is very heavy. But as a matter of fact the year 1905 was about the only year in which proper allowances for depreciation could be made owing to the small previous earnings of the corporation. In 1904 the company showed a deficit of $1,537,748, and earnings in 1903 were less than $1,800,000.

The $2,000,000 set aside for depreciation is equal to a little over one per cent of the property valuation of $171,000,000. The total tonnage of the International Mercantile Marine Co. amounts to about 1,000,000 tons, and the depreciation charges in 1905 were therefore at the rate of about $2 per ton, which appears to be all that has been set aside for depreciation since the company began business.

The increase of over $4,000,000 in gross earnings of the company for 1905 was due largely to the settlement of the passenger rate war, which was practically ended in March of last year, and to more satisfactory freight conditions. Another feature of the year's business was the immigrant traffic, which was the largest on record. The total number of passengers entering the United States was more than 1,000,000, as compared with 229,000 in 1898. It is believed the immigration business this year will be better than in 1905, which ought to add to the revenue of the concern.

The freight business was poor during the greater part of 1905, but showed material improvement in the latter part of the year. While the freight business has not fully recovered, it shows a material improvement over conditions as they existed at this time last year. Earnings since the first of the year have been larger than in the corresponding period of any preceding year, and if nothing unforeseen happens the showing for 1906 will be much better than that of 1905.

TRIAL OF BATTLESHIP GEORGIA.

The battleship Georgia, on her official speed trial last week, made a record of 19.26 knots an hour, not only exceeding by more than a quarter of a knot the speed required by her contract, but establishing herself as the fastest battleship of the United States navy. Her record exceeds by six one-hundredth knots that of the New Jersey, made off the New England coast on March 29, which was the best previous showing in the battleship class. The endurance and acceptance test of the Georgia began early in the forenoon, the battleship having left Rockland before 6 o'clock A. M., and all conditions were favorable. The starting line was between Rockland and Monhegan and the course extended out to sea in a long circle, terminating at the end of the four hours, near Cape Elizabeth lightship. The first hour's run was the best, 19.33 knots being made. On the second hour 19.27 knots were made; 19.241 in the third, and 19.20 in the final hour. During the last hour the supply of picked coal gave out and the ordinary fuel was used. This reduced the speed for that hour, and brought the average down correspondingly. John S. Hyde, president of the Bath Iron Works, where the Georgia was built, sent the following telegram to Gov. Joseph Terrill, of Georgia: "Georgia just finished official trial, proving fastest battleship in American navy."

The Georgia, in the course of the afternoon, started for Bath, where she will be completed. She will be ready to place in commission within two months.

The steamer Wawatam, which was in collision with the steamer George J. Gould on Lake Huron, arrived at Lorain this week with three damaged plates.

A revised chart in colors of L'Anse and Keweenaw bay, Lake Superior, has just been published by the United State lake survey and is for sale by the MARINE REVIEW.

The second steamer to be launched at the Ecorse yard of the Great Lakes Engineering Works on June 30 for the Cleveland Cliffs Iron Co. will be named Ishpeming.

Capt. Thomas J. Brady has been appointed master of the steamer Majestic to succeed Capt. Henry C. McCallum, assistant United States inspector of hulls at Detroit.

The little steamer Belle, which was sold by Clarence Parker, of Detroit, to Ohio parties, for the run between Cedar point and Sandusky, has been rechristened Fremont.

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TOLEDO SHIP BUILDING CO.'S PLANT.

Extraordinary dispatch is marking the work of transforming the yard of the Toledo Ship Building Co. at Toledo into a most capacious plant. Work upon the new dry dock did not begin until the weather opened, but the Great Lakes Dredge & Dock Co. has already finished the dredging and is at work on the piling. The dock will be ready to go into commission on Oct. 15. It will be 600 ft. long, 105 ft. wide at the top, 72 ft. width of blocks, 80 ft. width of gate. The portal will be of solid concrete and steel. This dock is designed to accommodate any ship up to 550 ft. in length. The gate of the dock has been made sufficiently wide to accommodate passenger boats without removing guard. Vessels will be launched into this dock from two berths, one on either side of it. The berth to the right will be 110 ft. wide, capable of accommodating the beamiest of passenger boats. The two berths and the dock will be commanded by a traveling crane capable of delivering material to any portion of the dock. A modern punch shop, 240 ft. long by 110 ft. wide, will be built at the head of the new dry dock and will therefore be most advantageously located for the delivery of material to either of the building berths or the dry dock. A pumping house, built entirely of concrete, will be erected to the left of the foot of the dry dock for the purpose of filling and emptying the dock. The pump-house will be connected by a tunnel with the second dry dock, so that it will fill and empty both of them. The second dry dock, which is to be an enlargement of the old Craig dock, will be 650 ft. long, 110 ft. wide on top, 72 ft. wide on blocks with an 80-ft. gate. A locomotive crane will be installed to the left of this dry dock of ten tons capacity at 50-ft. reach for the purpose of handling heavy weights on repair jobs. Vessels will be launched into this dry dock from a building berth on the right.

The new power house, built of reinforced concrete, is a model of compactness. It has direct connection to railway tracks so that the railway cars actually dump the coal into the cellar of the power house from which it is elevated into hoppers and fed as required by the furnaces. These hoppers have a capacity for 400 tons of coal. The chimney of the power house is 110 ft. high. The pumping station, located at the foot of the second dry dock, for the purpose of supplying the yard with water, is also of concrete. A four-story concrete building is now under construction adjoining the present office building. The lower floor is to be utilized as a general store, the second story as a pattern shop, and the two upper floors for storage purposes. This building is of extremely massive construction, and is evidently intended to figure profitably in the maintenance account as the years go by. It would not appear as though this building would need any repairs for a score of years after it is completed.

The barge Manila occupies the second dry dock at present. The Manila, while in tow of the steamer Lafayette, was driven ashore near Two Harbors in the great storm on Lake Superior last November. The Lafayette became a total wreck and the Manila was extensively damaged. She was released from the rocks by Capt. James Reid and put in temporary shape for the trip to the lower lakes. She reached the Toledo ship yard on Saturday last. Her injuries are of the most extensive character, constituting one of the heaviest repair jobs ever undertaken in a lake ship yard. The ship building company has put 400 men at work upon her and it will take between two and three months to repair her. Her entire bottom will have to be replaced, as well as a considerable part of the tank top. She will probably be converted into a steamer using the Lafayette's machinery though this will not be done until the end of the season.

It is expected that the freighter now under construction that was sold last week to Mr. G. A. Tomlinson, of Duluth, will be delivered in September. This steamer is 458 ft. over all, 438 ft. keel, 52 ft. beam and 30 ft. deep. Her hatches are 24-ft. centers and 12 ft. fore and aft. While she is not of hopper bottom construction she has sloping sides for a distance of five feet above the tank top to facilitate the unloading machines. As soon as this freighter is launched another of the same dimensions will be laid down for stock account.

The steamer Theodore Roosevelt underwent her dock trial at the yard on Thursday last and proved successful in every way. She was delivered to her owners on Tuesday of this week. The Roosevelt is an exceedingly trim-looking craft, 289 ft. over all, 270 ft. keel, 40 ft. beam and 16½ ft. deep. She is highly powered, having four-cylinder, triple-expansion engines, supplied with steam from seven Scotch boilers, allowed 200 lbs. pressure. She is beautifully finished throughout in mahogany with commodious cabins and extensive promenades. Her cabin accommodations are limited as she is intended for day service. The Indiana Transportation Co. certainly have a superior craft in her and one that is very likely to become popular with the public.

MORE SHIP CONTRACTS.

Contracts for ships, and talk of contracts for more, has been the feature of the past week in ship building circles. Mr. J. C. Wallace, president of the American Ship Building Co. closed contract last week for a freighter for Wm. A. and Arthur H. Hawgood, of Cleveland. She will be practically a duplicate of the James C. Wallace, being 552 ft. over all, 532 ft. keel, 56 ft. beam and 31 ft. deep. Her hatches, of which there will be thirty-two, will be spaced 12-ft. centers, and will be fitted with the Brosseau hatch covers. She will be of hopper bottom construction with water ballast tanks extending up the sides. She is promised for delivery on April 15 next. This makes twelve freighters that the American Ship Building Co. is building for 1907 delivery in addition to the great passenger boat for the Detroit & Cleveland Navigation Co. Other contracts are pending and will probably be closed in a few days. It was reported earlier in the week that contract had actually been let for the 645-footer that Mr. Wallace referred to at the launching of the Sir Thomas Shaughnessy but Mr. Wallace says that such is not the case. It is predicted that the 1907 building program will equal, if not surpass, the extensive program for 1906. This projection of orders so far ahead of actual delivery is one of the recent developments in the lake ship building situation and reveals the absolute confidence of conservative interests in the growth of lake trade.

The extensive plant of the J. L. Mott Iron Works, at 133rd street and Third avenue, for more than half a century the greatest industry in upper New York, has moved its plant to Trenton, N. J. The property of the concern extended from 135th street south to the Harlem river and from Third avenue westward to the Mott Haven canal, also named after the head of the firm. As much of the old machinery as could be temporarily dispensed with has been transported from the Mott Haven plant to Trenton within the last six months. Several hundred of the employes were taken over to Trenton some months ago and are now working in the new plant, which is in operation.

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THE MARINE REVIEW

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JUNE 21, 1906.

THE SITUATION AT SAULT STE. MARIE.

Mr. Harvey D. Goulder, counsel for the Lake Carriers' Association, has submitted a brief to William Livingstone, president of the Lake Carriers' Association, on the present situation at Sault Ste. Marie. Sault Ste. Marie, as everyone knows, is the most important point on the chain of lakes since it marks the navigable connection of Lake Superior with the lower lakes. As a single unit the waterborne commerce of Lake Superior is not equaled by that of any waterway in the world. Of late years private companies have sought to utilize the water of the rapids for power purposes, and in the development of these purely private enterprises rivalries have naturally arisen. At the last annual meeting of the Lake Carriers' Association at Detroit, Mr. Goulder was especially careful in emphasizing the fact that the Lake Carriers' Association as a body must hold itself aloof from these purely independent ventures, preserving a strict neutrality, avoiding even the suspicion of favoring one interest or another, but standing squarely on the ground of the paramount right of navigation. His point was that the Lake Carriers' Association should not be drawn into any private squabble. After directing the attention of the convention to encroachment on lands and waters north of the government works, he submitted the following resolution, which was adopted:

Resolved: That we declare our opposition to any works in progress or any encroachment on the lands or waters north of the government canal, all which waters, owing to the great and rapid growth of tonnage on the great lakes, will be required by the government to make suitable provision for the needs of navigation in the near future. That levels must be maintained, navigation must be protected, the public must have absolute right to use any portion or all of the natural flow in the future, free from any private use, and we, therefore, declare our opposition to any works in progress and call upon the government to clear the rapids from all encroachment and private improvement of any kind; and if the parties operating these have vested rights, that the government acquire the same in a proper and just manner. This action is taken upon the firm conviction that the needs of the country demand that the whole space north of the present locks and government works out to the international boundary line, are required and will be rapidly utilized for navigation purposes.

This resolution clearly defines the position of the Lake Carriers' Association. The association is opposed to any encroachment in the territory north of the Poe lock. The Chandler-Dunbar Power Co. is engaged upon works north of the present Poe lock, but the Lake Carriers' Association is not opposed to the Chandler-Dunbar company itself. It is simply opposed to the use of the space north of the Poe lock for any private purpose. Its attitude towards the Chandler-Dunbar company is entirely impersonal. A member of the Chandler-Dunbar company has latterly in a newspaper article charged the Lake Carriers' Association with being used as a cat's paw by another private interest at the Sault, thus projecting the very situation that Mr. Goulder was so careful to avoid. If the charge is founded upon any unguarded utterance of any member of the association it is nevertheless untrue in its general application to the association. All that the Lake Carriers' Association desires is the safeguarding of the rights of navigation.

Mr. Goulder in his brief submitted to President Livingstone shows that the commerce of the canals at Sault Ste. Marie has trebled in the past ten years and has actually multiplied twelve times in the past twenty years. The commerce of the canals for 1885 was 3,256,628 tons; for 1895, 15,062,680 tons; and for 1905, 44,270,680 tons. Upon this basis of increase the commerce ten years hence will amount to 107,000,000 tons and twenty years hence to the astounding total of 202,000,000, tons. The contention of the Lake Carriers' Association, therefore, is that all available space north of the present Poe lock will eventually be needed to accommodate the demands of navigation.

It was the general belief at the recent convention of the Lake Carriers' Association that the war department was planning to construct a third lock north of the Poe lock. Tentative plans were submitted showing the general location of such a lock. The Lake Carriers' Association is much perplexed to discover now that the war department is preparing to enlarge the Weitzel lock rather than to construct a third lock. While in Washington recently protest was made against this proposed arrangement on the ground that lake commerce could not suffer to be deprived of the use of the Weitzel lock. Much surprise was expressed at this turn of affairs and an inquiry was immediately instituted by the association. The attention of Mr.

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T. E. Burton, chairman of the committee on rivers and harbors, was directed to the matter with the result that an act will be introduced at the next session of congress directing the war department to construct a third lock north of the Poe lock. Money is immediately available for the widening of the present canal above the locks and contracts for this work will probably be let within a few weeks. Mr. Goulder concluded his brief as follows:

It is for the United States government to begin at once and vigorously prosecute the widening of the canal, for which the money was appropriated in 1902 and is at hand available. Every day experience shows a real necessity for this improvement to accommodate the two present locks. Dangerous currents are created, delays are involved in the operation of our canal and locks even now for want of adequate approach, growing more and more inadequate with the increase in the size of ships and in the volume of traffic.

The concensus of opinion is that, expedited as it may be, a third lock cannot be constructed so soon as there will be pressing need for it; and serious delays are bound to occur with the present facilities, as we may judge by experience, in the actual practical operation and transmission of traffic by all of the existing facilities at the Sault, aided as these will be materially by increase of the present canal approach.

The time consumed in building the Weitzel lock was 11 years; of the Poe lock nine or ten years; and the Canadian lock about eight years, as shown by government report. To take out of commission the Weitzel lock and deprive the traffic of its use while there is building, on or partially on its site, a new dock, is a proposition which cannot and will not receive the approval of the vast interests dependent upon navigation through the Sault, even though the brightest hope of a three years' construction might be realized.

In the face of the facts shown, the dependent interests (and these are national in their range and character), justly claim that there will be required a series of locks to the northward of the present lock to accommodate the so rapidly increasing traffic. It will hardly be claimed that one canal could in this character of navigation afford reasonable approach to more than two locks. To properly utilize those locks north of the Poe lock, which will require to be constructed, it will be appropriate to have one or more canals, according to the progression of the traffic, to the northward of the present canal as the same shall be widened.

The experience in respect of currents which we are undergoing daily indicates also the wisdom of an independent means of filling the locks without drawing the water through the approach canals; and it is not questioned that this may be done by building a suitable dam at the appropriate point out across the rapids, so making a fore-bay from which the locks, in any number, may be filled through tunnels and other equivalent means.

In order to accomplish what so plainly is necessary, looking to the present and immediate and assured future, as well as to the hope of the more distant future, the national government, for the protection of its national necessity should have and keep control of the land and water and the land under water out to the international boundary line, and that it join with our neighbor so far as necessary to the mutual interest in preserving the national advantages which nature has furnished at this point; the supreme point of this character in this country, if not, as already has been claimed, in the world.

The history of revocable licenses has shown difficulty in the disturbing of rights under which have developed fixed structures and local dependence of business and other interests. The history of such matters exemplifies the truism that "an ounce of prevention is worth a pound of cure." These waters and the land under them, as certainly as anything can be in business, are increasingly necessary to the United States. Complications cannot arise from the use of such international boundary waters for purposes of navigation by great commercial canals and locks free to our neighbors as hers are and will be to us; and an international commission exists, and may be continued, capable of dealing with such a subject without friction. The development of the northwest has come from, and its future in great measure depends upon, the unrestricted navigation of these waters. Our industrial supremacy has been built up and clearly depends upon the unrestricted navigation and the aid of the facilities at the Sault. Yet as before shown, the value of the iron ore and products of iron represented but 27 per cent and the cereals represented 28 per cent and general manufactures and commodities represented 45 per cent in value of 417 million dollars of traffic through the Sault in the single year 1905. Therefore to permit private business enterprise of any kind to get in the way and interfere with this traffic and its necessities, is something which the Lake Carriers' Association, and after its investigation the International Waterways Commission, in common with all concerned, directly or indirectly, in the great dependent industries of this country, whether as owner or operator or workman concerned in mines, wheat fields, furnaces and every variety of human endeavor, may most justly view with the alarm which has been expressed, and may call upon the government to prevent.

The admonitions of more than sixty years, the warnings through that time, the effort as long ago as 1822 by the military officers of the United States to reserve this property, have been only in part followed, but in the belief of the interior department and the opinion of the department of justice, they have been sufficiently followed to establish and protect the public rights.

The courts have been appealed to, and this is doubtless a proper subject for congressional action; if through any slip private rights have been acquired, congressional action may be necessary to acquire and compensate for these rights. For the present the licenses which have been granted are revocable, and can be revoked at any time by the same authority which granted them and efficaciously revoked; and all work under government permission stopped. The government can be expected, of course, to care for its rights so far as they depend upon claims of ownership and legal rights of persons. In the history of these encroachments it appears as if one revocable license after its granting was surrendered in consideration of a broader license; and now there is strangly depending a quitclaim deed to the government, for the consideration of one dollar, of a part of this property which the government claims to own, and which claim the attorney-general is seeking to enforce in the litigation now pending; and which might even work an estoppel against the government by its own act in accepting.

Nothing should be permitted to delay the work at the Sault, first of widening the present canal, for which money was appropriated on representations of the commercial interests which were so conservative that they have in every respect already been exceeded. The official statement of operations at the Sault, coupled with the reported results of investigations by an international commission, appeal eloquently for the complete reservation of the land and the waters and the land under the waters north of the present locks and canal; and they appeal with equal eloquence for the most rapid possible increase by canal and lock of the present facilities in the face of official and expert opinion, based on investigation, that these improvements will not be able to keep pace with the requirements of the traffic; while, to the people generally of this country, a saving of $116,000,000 in 1905, increasing some twenty per cent a year, stamps the situation at the Sault as one which, in the general interest, may not be made the opportunity of narrow private gain.

FREIGHT SITUATION.

Rain, wind and thick weather have interfered seriously with lake trade during the past week, but notwithstanding the ore movement has been fairly good, carriers getting reasonable dispatch at upper lake ports. The Lake Superior region has been subjected to excessive rains so that a number of the open pit mines are filled with water, interfering greatly with dispatch. The wind was so high at times that workmen were afraid to venture on the shipping piers for fear of being blown off. In addition the weather has been so thick outside that vessels have had to feel their way along in order to avoid strandings. As it is, the number of collisions and strandings, due to thick weather, have been numerous. One vessel, the Grecian, foundered. The accidents have been so many that practically every dry dock on the great lakes is engaged for some time ahead. In spite of these interruptions, however, the movement of freight has been large, adding further testimony to the magnificent equipment of the great lakes in the way of ships, docks and railways. Rates hold steady. No change is expected in the ore and coal rates until fall. The attitude of the insurance companies towards wooden tonnage has made it almost impossible for this class of craft to seek profitable employment in the ore and coal trades. A leading shipping interest will not charter wooden tonnage at all unless the cargo insurance is borne by the vessel owner which, added to the stiff advance in hull insurance on this kind of craft makes it extremely difficult for the wooden vessel to find a profit in the business. A new company known as the Vessel Inter-Insurers, has been formed to carry the hull insurance of the lumber fleet. It was formed by leading lumber vessel owners and confines itself exclusively to the business of its members.

CORRECTION.

Editor MARINE REVIEW: I wish to correct an error in your last issue of the steamer Joliet colliding and sinking a dredge scow in the Sault river. The scow was sunk previously to the Joliet striking it by another Pittsburg steamer, and Capt. Stover was not aware of any obstruction in the channel until his steamer struck the scow which was fully 15 feet under water.

Two Harbors, June 19. H. T. KELLEY.

The steamer B. Lyman Smith took a sheer on the west side of the Canadian channel after leaving the docks at Sault Ste. Marie and grounded outside the red stakes. A hole was punched in the steamer forward and her forepeak filled with water. Temporary repairs were made.

Sloan Bros., Seattle, Wash., are building a new steam schooner for the Washington Marine Co., Seattle, Wash. The schooner will be 174 ft. over all, 34 ft. beam and 12 ft. deep.

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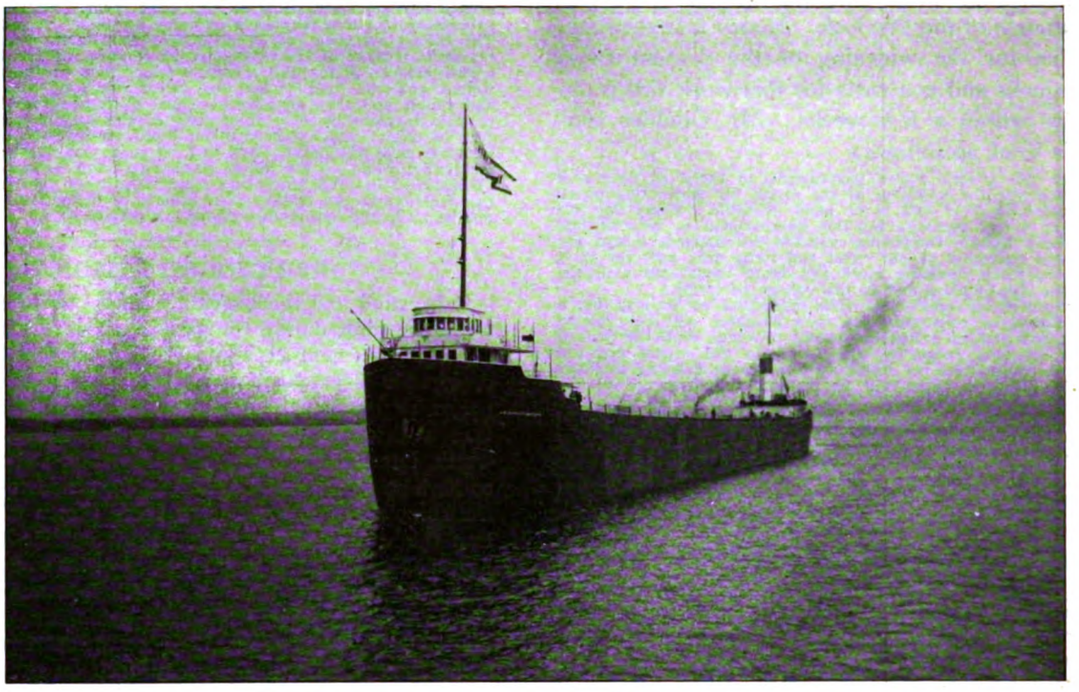
THE MORGAN'S SECOND CARGO.

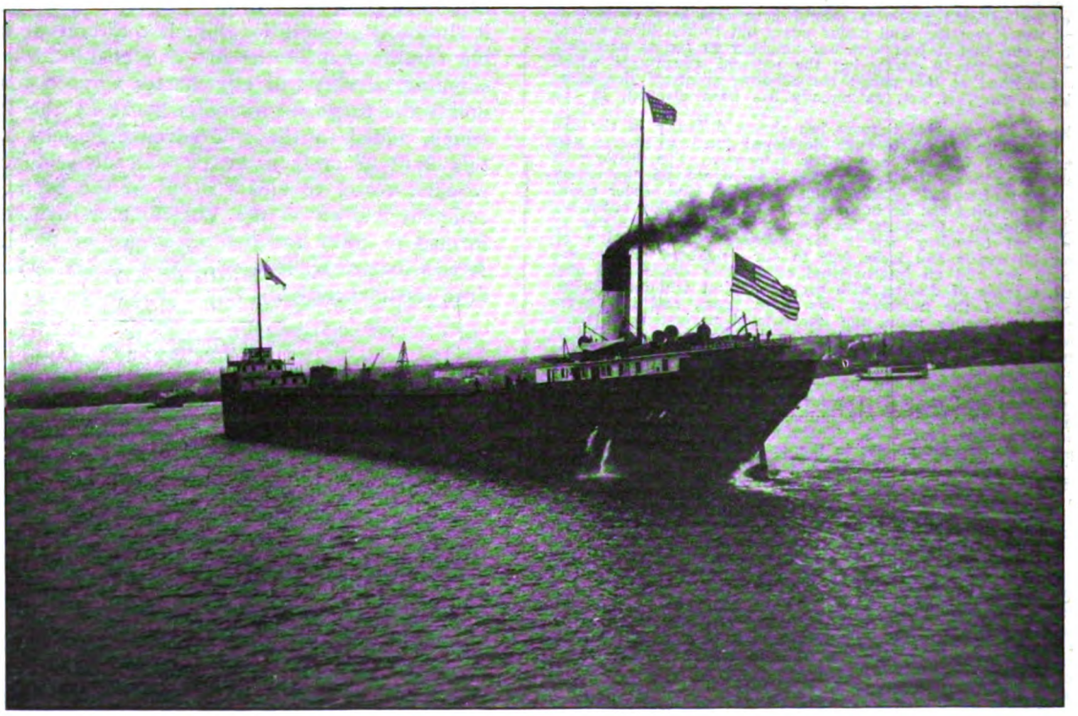
The steamer J. Pierpont Morgan, belonging to the Pittsburg Steamship Co.'s fleet, left Two Harbors this week on her second trip with 10,378 gross tons or 11,623 net tons of ore consigned to Conneaut. While this cargo is by no means indicative of the vessel's capacity, it is nevertheless one of the largest cargoes ever carried from a Lake Superior port to a Lake Erie port. The Gary last year carried 11,203 gross tons or 12,547 net tons of ore from Ashland to South Chicago, but it must be understood that on this route deeper water prevails than on the Lake Erie run. Moreover, stages of water this year are lower than last.

LAUNCH OF THE HENRY H. ROGERS.

The steel freighter Henry H. Rogers, building for the Pittsburg Steamship Co., was launched at the South Chicago yard of the American Ship Building Co. at noon on Saturday last. This steamer is the second, of the four now building for the company, to be launched. In general dimensions these four vessels, the J. Pierpont Morgan, Henry H. Rogers, Norman B. Ream and Peter A. B. Widener, are the largest carriers on the lakes. They are 600 ft. over all; 580 ft. keel, 58 ft. beam and 32 ft. deep. Their engine power is no greater than that of steamers half their length and they are therefore most economic fuel consumers.



BOW VIEW OF THE STEAMER J. PIERPONT MORGAN.



STERN VIEW OF THE STEAMER J. PIERPONT MORGAN.

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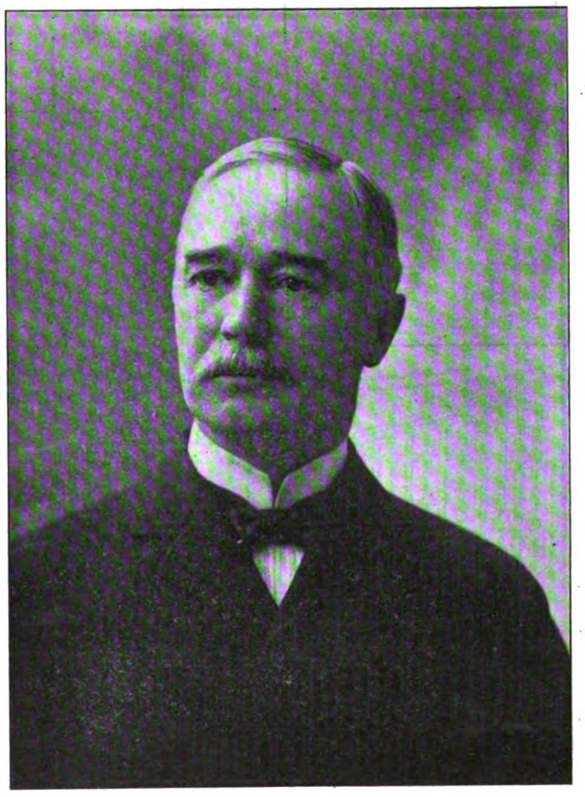
The Rogers was christened by Miss Marion H. Rogers, niece of Mr. H. H. Rogers, of the Standard Oil Co., in whose honor the steamer was named. At the conclusion of the launch the launching party was taken in a special train to the Auditorium hotel where luncheon was served. Mr. E. C. Collins, traffic manager of the Pittsburg Steamship Co., presided. Those present were: Mr. W. L. Brown, Mr. and Mrs. L. D. Dody, Mr. and Mrs. W. D. Haynie, Mr. A. T. Ewing, Miss Ewing, Mr. and Mrs. Edmund V. Dexter, Mr. Nelson G. Franklin, Mr. and Mrs. Rufus A. Rogers, Mr. Rowland T. Rogers, Capt. and Mrs. Dennis Sullivan, Mr. and Mrs. Homer J. Carr and Mr. and Mrs. C. E. Curtis.

The Rogers will go into commission in about three weeks. Her companion ship, the J. Pierpont Morgan, has already broken the cargo carrying record on the lakes, having carried 13,294 gross tons of ore from Escanaba to South Chicago on her maiden trip.

LAUNCHING THE WILLIAM G. POLLOCK.

The steamer Wm. G. Pollock, building for Mr. W. H. Becker, of Cleveland, was launched on Saturday morning last at the Cleveland yard of the American Ship Building Co. and was named in honor of Mr. Pollock by Mrs. W. H. Becker. Rarely has a ship yard been so crowded with personal friends on the occasion of a launching, Messrs. Pollock and Becker being among of the most popular men on the lakes. The steamer went overboard without a hitch at eleven o'clock and luncheon in honor of the event was given at the Roadside club at four o'clock Saturday afternoon. Among those present were Mr. and Mrs. W. H. Becker, Mr. and Mrs. W. G. Pollock, James C. Wallace, George Arnold, Robert Wallace, Mr. and Mrs. John A. Donaldson, Mr. and Mrs. Fred Saal, Capt. John Mitchell, W. A. Hawgood, Capt. Arthur H. Hawgood, Martin Mullen, H. B. Hawgood, James J. Buckley, J. H. Hobbs, of Pittsburg; Capt. Henry W. Stone, W. H. Hill, Mr. and Mrs. Charles Williams, Robert Logan, N. J. Boylan, Capt. Boylan, Burt Foster, Harry Donaldson, John Kelley, George Randerson, Frank Seither, Mr. and Mrs. J. A. Matthews, Mr. and Mrs. A. D. McBeth, Miss McBeth, Charles L. Murfey, Willie Becker, Miss Zuelika Becker, J. L. Wallace, Miss Lydia Wallace, Miss Edith Randerson and Miss Matthews.



MR. W. G. POLLOCK.

The W. G. Pollock is one of the smallest steamers now under construction on the lakes. She is 440 ft. over all, 420 ft. keel, 52 ft. beam and 28 ft. deep. She will have triple-expansion engines with cylinders 22, 35 and 58 in. diameters by 40-in. stroke, supplied with steam from two Scotch boilers, 13 ft. 9 in. by 11 ft. 6 in., fitted with Ellis & Eaves draft and allowed 180 lbs. pressure.

NEW WRECKER AND LIGHTER.

The American Ship Building Co. will build a wrecking tug and lighter at its Buffalo yard for the Great Lakes Towing Co. This expenditure was authorized at a meeting of the executive committee of the Great Lakes Towing Co. held in Cleveland this week. It will be some weeks before the details are worked out, but it is the purpose to make the tug the most powerful on the lakes and the wrecker the most capacious. The tug will be in fact a floating repair shop. She will have grab buckets for lightering cargoes, compressed air outfit, machinists' and blacksmiths' outfit, electric light plant, and all appliances to facilitate the wrecking and repair of ships. The tug will cost about $150,000. The lighter will be much larger than the Newman and Rescue and will be capable of being taken out in heavy weather. She will be of about 3,000 tons capacity. The size of lake ships has increased so rapidly of late years that President Smith of the towing company holds that the ordinary wrecking tug is not powerful enough to handle them.

IN HONOR OF MR. FIRTH.

At the meeting of the board of directors of the Erie & Western Transportation Co., Mr. John E. Payne was elected president. The office of vice president at Buffalo and also the office of vice president at Philadelphia was discontinued, the president assuming the duties heretofore assigned to the vice president. The resignation of Mr. Firth was received with great regret. The board of directors adopted the following minute:

"The retirement of Mr. Frank J. Firth from the presidency of this company, after occupying the office for twenty-five years, meets with the sincere regrets of this board. His administration of the company's affairs has been marked by an unwavering interest, tireless energy and conscientious care; and it has been in the largest measure due to his conservative foresight, coupled with his keen appreciation of the public requirements, that the company has been brought to its present high standard.

"The members of the board desire to put upon record their cordial appreciation of all that Mr. Firth has been to them individually and of his invariable courtesy, and to extend to him their best wishes for his future welfare and happiness as well as their gratification that he is to continue a member of the board."

The steamer Saturn, of the Gilchrist fleet, collided with the schooner Ontario in Lake Huron about fifty miles north of Port Huron in a heavy fog. The head gear of the Ontario was carried away by the bow of the Saturn. The schooner was taken to Port Huron by the Saturn.

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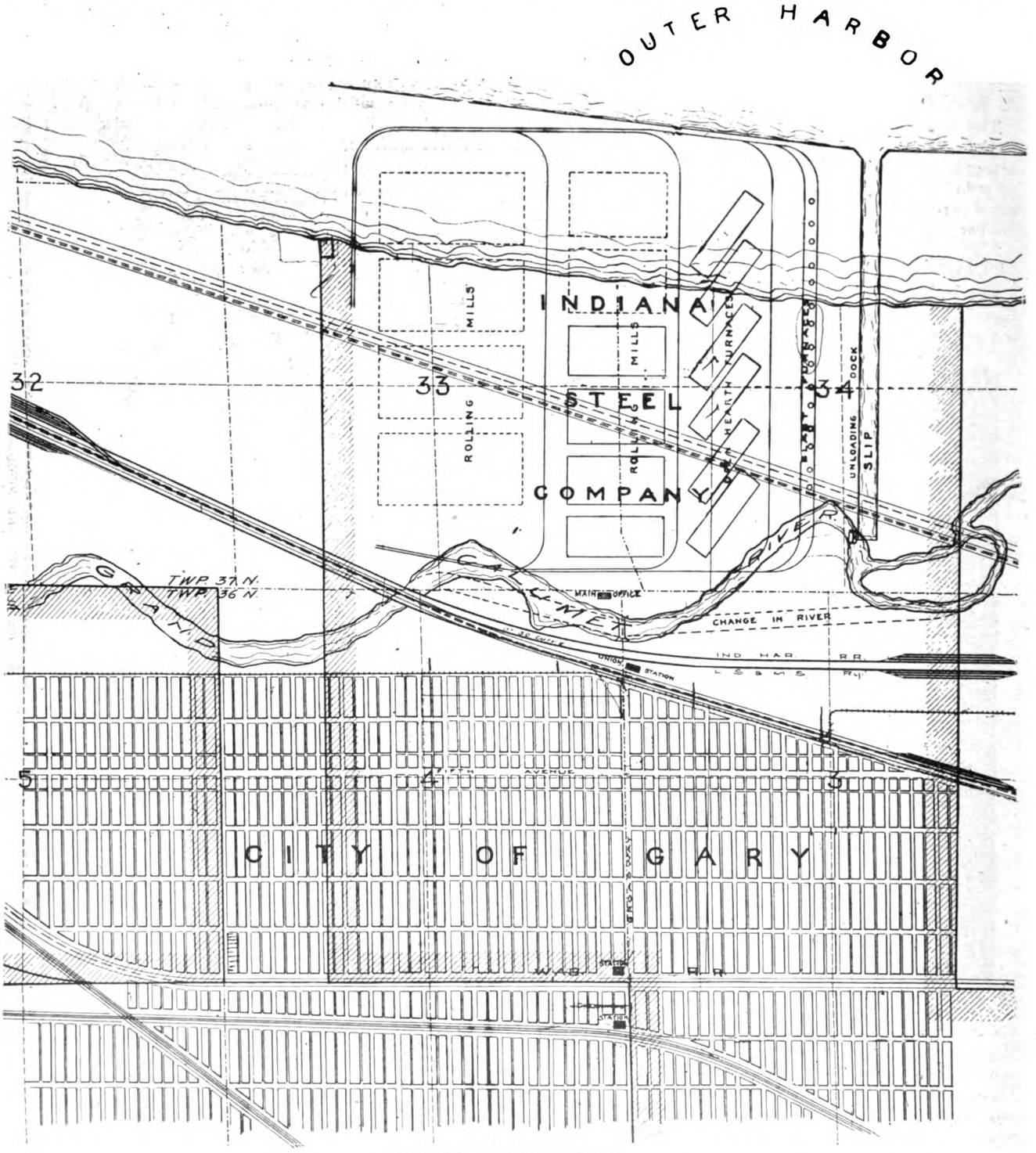
NEW LAKE PORT.

The United States Steel Corporation is rapidly creating at the extreme southern end of Lake Michigan in Lake county, Indiana, a new harbor, known as Gary, which will eventually become one of the leading, if not the leading, ore receiving ports on the great lakes. The subject is, therefore, one of vital importance to the vessel interests of the great lakes and the MARINE REVIEW takes pride in presenting herewith the first comprehensive and authentic plans for the creation of the new port. These plans include a diagram of the plant of the Indiana Steel Co. which the Steel Corporation is building; the platted section of land upon which the town of Gary will be built; and a general view of the geographical location of the plants in relation to surrounding towns. The new plant will



PLAN OF THE CITY OF GARY.

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be the largest single plant in the world; the town of Gary, the best laid out and most sanitary city that engineering talent can design. It is expected that ultimately the steel plant will ploy 15,000 men and that the city will contain 100,000 inhabitants.

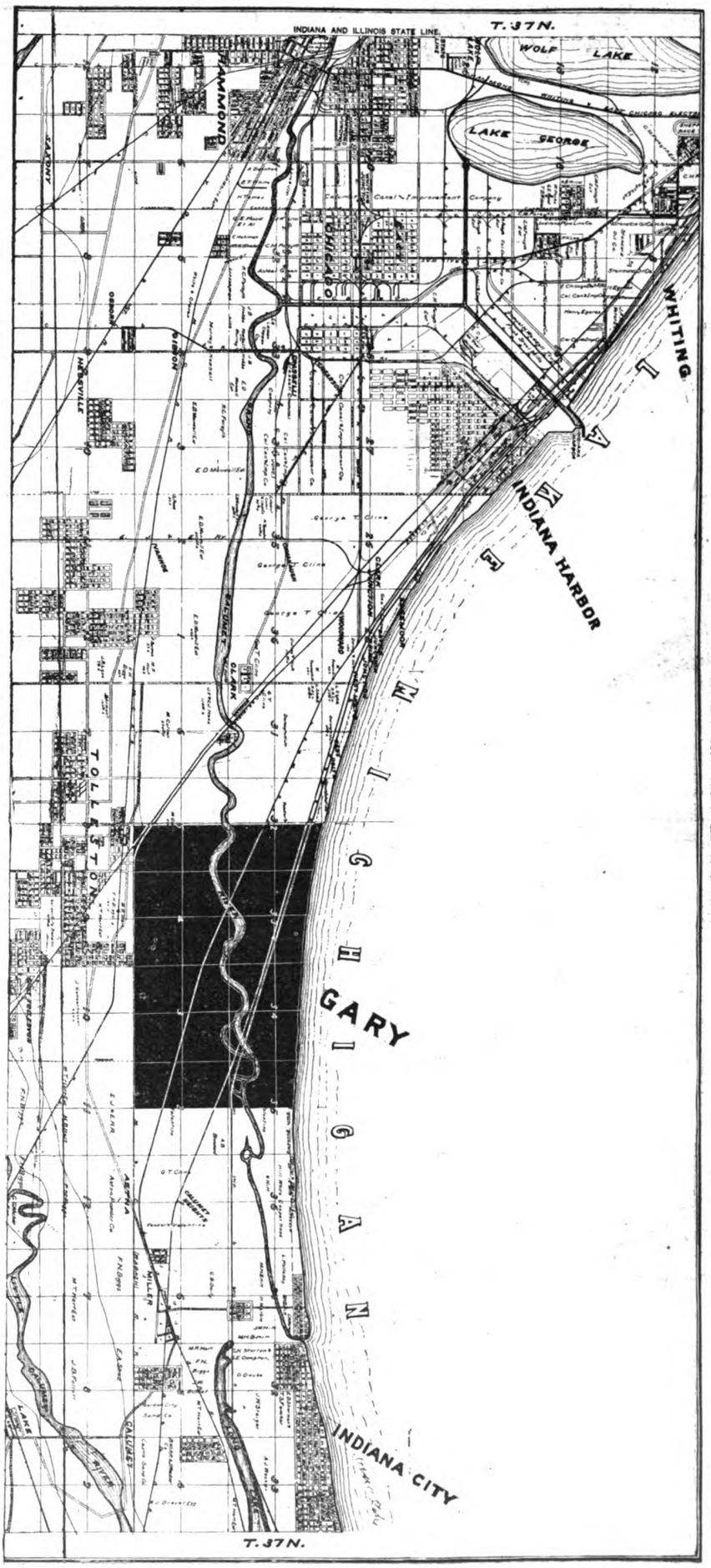
The construction of the works and town will proceed with equal despatch and regularity in order to provide homes and employment for the workmen and their families. Both will be built in such a manner as to permit indefinite expansion as later needs shall dictate. Substantially, 6,000 acres of land have been secured by the Steel Corporation, and all that portion lying north of the Grand Calumet river, amounting approximately to 1,280 acres, or two square miles, will be devoted to the requirements of the plant.

GENERAL PLAN OF CONSTRUCTION.

The enterprise is to be of such gigantic proportions that its construction must be on a unit plan. The diagram shown on the accompanying insert is but a tentative arrangement, as only the most fundamental details have thus far been worked out. Therefore, this article contains nothing more than a recital of these and a general resume of the whole. Further elaboration may compel minor changes, but it is not expected that the general scheme will be changed to any extent. In its completed state, it is estimated that the plant will handle substantially 5,000,000 tons of ore a year, and produce annually, in round figures, 2,500,000 tons of steel. There will be 16 blast furnaces, of 450 tons daily capacity each, and 84 60-ton basic open-hearth furnaces. The finishing end will include slabbing, blooming and billet mills, a rail mill, of 900,000 tons annual capacity, one 48-inch and one 160-inch plate mill, with an estimated combined capacity of 300,000 tons a year, structural mills and 8-inch to 20-inch merchant mills. Neither of the latter has been designed as yet, and no data are at hand of the probable capacity of either on structural or merchant shapes, other than that a variable range of sizes will be rolled.

CHICAGO'S GROWING IMPORTANCE.

But stripped of all the glamour surrounding an undertaking of such huge proportions, the most important feature of this plant, from a western standpoint, is that it is proposed to make it independent of all the established coke regions for its fuel supply. In this respect, it will be the only steel works so equipped in the Chicago district. The type of ovens



LOCATION OF GARY AND NEIGHBORING TOWNS.

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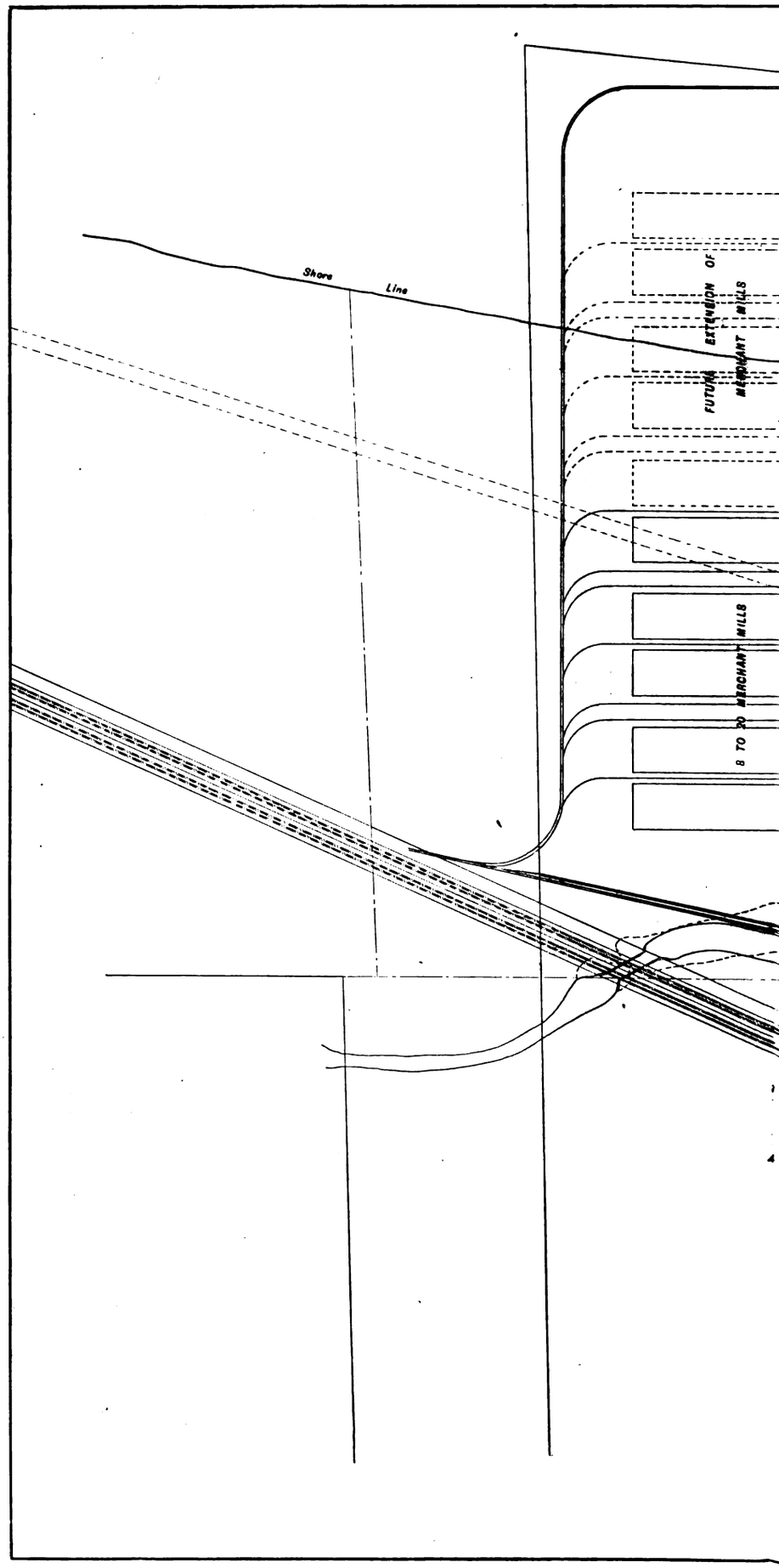
to be used, and the number to be built, are still unsettled questions, and it is scarcely probable the company will reach them until after the completion of the work now under way. But in providing ample accommodations for a coking plant, of capacity large enough to supply the needs of the works, the company has decided the question of economy in such an installation as against the risks, inconveniences and expense of haulage from the established coke centers in Pennsylvania and West Virginia, and has added another link to the chain of events which is gradually bringing Chicago into rivalry with Pittsburg as an iron and steel producing center.

Upwards of $75,000,000, it is said, have been set aside by the Steel Corporation for the fulfillment of its plans at Gary; and it is the intention to embody in this enterprise all that modern science knows of the production of steel and in the building of a perfect American city, which will include libraries, theatres, parks, play-grounds and a social center. Practically all the machinery in the steel plant will be electrically driven, blast furnace gas being used to the largest extent possible for generating the current to drive the motors. Part of the undertaking involves the construction of an inner harbor and dock for the unloading of ore cargoes, as well as the changing of the course of the Grand Calumet river. The lake is very shallow at the point where the steel plant is to be located, navigable water being nearly 2,000 ft. from the beach. From deep water in the lake to the site of the ore piles, a slip will be built 250 ft. wide, 25 ft. deep and one mile long. In changing the course of the river, only one object was desired, namely, to fill in the stream where it encroached on the steel plant. A new waterway, flowing directly east and west, will be excavated, and this afterwards will form the boundary between the town and the works.

ECONOMY IN HANDLING.

The plant has been designed to obtain the greatest economy in the handling of materials. At the extreme eastern end of the company's property, the coking plant will be located. The land on which the ovens will be built is 1,000 ft. wide and one mile and a half long. The slip, ore yards, blast furnaces, open-hearth furnaces and finishing mills follow one another in the rotation named, an arrangement which will compel the location of all future extensions either to the west, or northward into the lake. As stated before, the plant will be built in units. The first unit, which will provide the company with one-quarter of the estimated total output, includes four blast furnaces and two of the open-hearth groups, comprising 28 furnaces, rail mill, machine shop, boiler shop, store house, foundry, pattern and carpenter shop. Necessarily the construction of the ore yard and slip goes with this work. The completion of the remaining furnaces and mills will be governed largely by trade conditions at the time. Fully 50,000 tons of structural shapes will be required in the erection of the buildings embraced in the first unit, from which may be obtained an idea of the enormous tonnage of steel that will ultimately be consumed here. The American Bridge Co. has the contracts for the frame work of the open-hearth buildings, the machine shop, store house, boiler shop, pattern and carpenter shop; and the Riter-Conley Co., of Pittsburg, has the contract for the shell work of the four furnaces. The blowing engines have not been ordered. Specifica-



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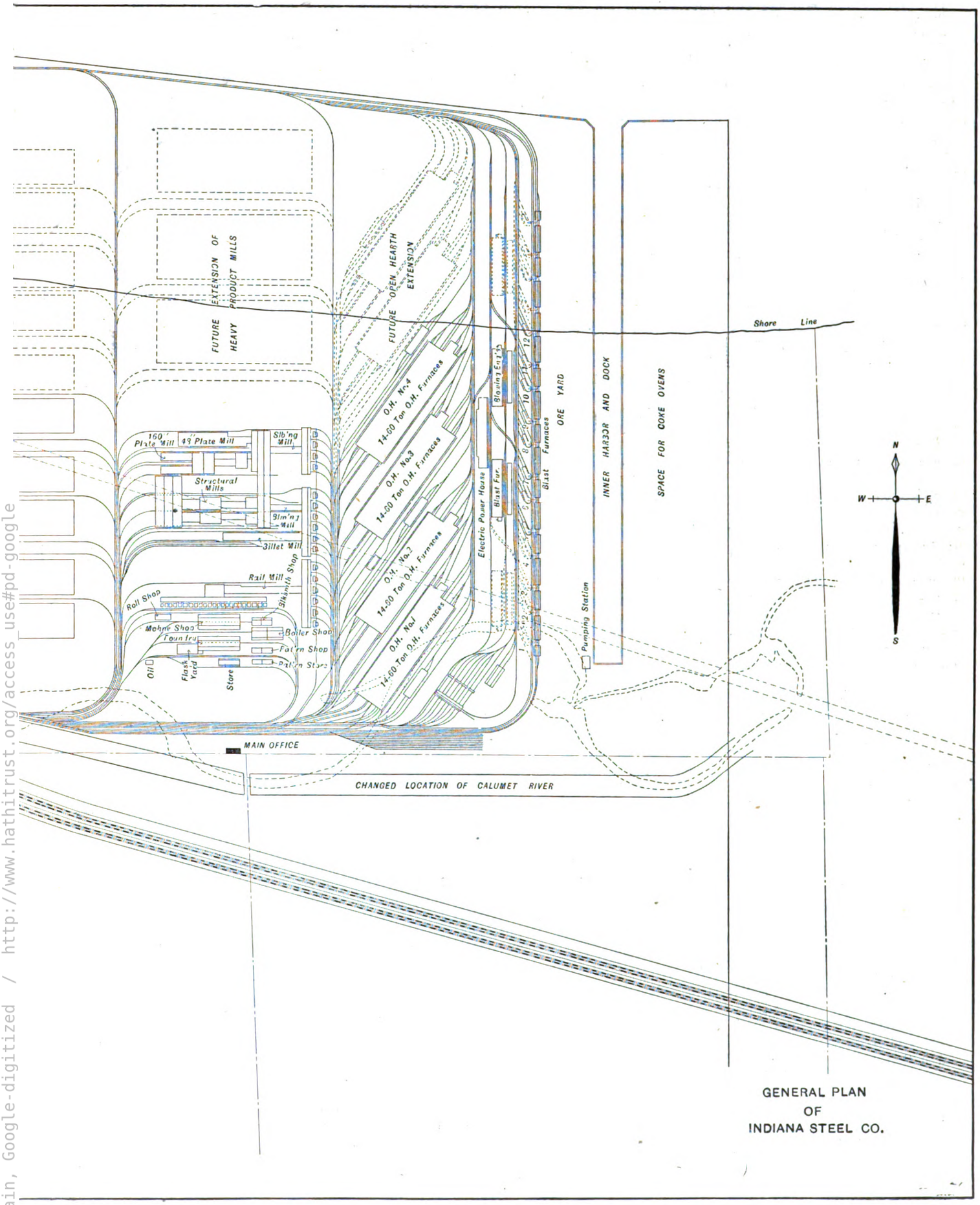

GENERAL PLAN
OF
INDIANA STEEL CO.

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tions for the rail mill are still uncompleted, but the American Bridge Co. will doubtless erect the frame work. The interior of the open-hearth plants will be built under the supervision of the company's engineers.

OPEN-HEARTH BUILDINGS.

The open-hearth buildings will be identical in every detail. Each will be 1,189 ft. long, and 204 ft. 5½ in. wide, and will contain 14 furnaces of 60 tons capacity each. The charging floors are 80 ft. wide, and the pouring floors 61 ft. wide. The latter will have four pouring platforms. The charging floors will be served with 75-ton electric cranes, and the pouring floors with 125-ton cranes. The charging floors open into the storage yards, each 71 ft. 9 in. wide. These run the entire length of the open-hearth buildings, each of which is served by a 5-ton crane. At the end of each open-hearth group nearest the blast furnaces are the mixer buildings, having mixers of 300 tons capacity. These will be operated by hydraulic power. The frame work of each building will be 85 ft. 6 in. wide and 120 ft. long, and the ladles will be handled by 75-ton cranes having 15-ton auxiliaries.

The dimensions of the machine shop are 147 x 400 ft. The main bay will be 77 ft. wide, with a clear height of 47 ft. 3 in. The side bays are 35 ft. wide each. A 25-ton crane, having a 75-ft. span will be installed in the center bay. The blacksmith shop will be 62 x 100 ft., and the carpenter and pattern shop, 51 ft. 3 in. by 100 ft. The latter will have two floors. The boiler house will be 130 x 160 ft. with two lean-tos, 35 ft. each. The clear height of the main bay of this building will be 42 ft. 6 in. The store house is 59 x 200 ft., and will also have two floors. Contractors are already engaged in clearing the land and putting in the foundations for all these buildings.

THE LOCATION OF GARY.

The tract upon which Gary is to be built has a mean altitude of 25 ft. above the level of the Calumet river. It lies 10 miles east of Hammond and 26 miles southeast from Chicago, and is virtually a suburb of that city. Ample railroad connections are provided by the following trunk lines, all of which pass through it: Baltimore & Ohio, Lake Shore & Michigan Southern, Wabash, Michigan Central and Pennsylvania. The following belt lines also tap the territory: Indiana Harbor, Chicago, Lake Shore & Eastern, Elgin, Joliet & Eastern, and Chicago Terminal Transfer. All the railroad tracks will be elevated through Gary, and the Pennsylvania through Tolleston. The Elgin, Joliet & Eastern, which is owned by the Steel Corporation, will have extensive yards just south of Clark Junction, with a capacity of 60,000 cars. In addition to the rights of way of the various railroads, the town will establish a permanent right of way due east and west and north and south, which, for a consideration, any road may use. The Chicago, Lake Shore & South Bend Interurban Electric Railway will use the principal right of way, running east and west along the north border of the town, while the Indiana, Logansport & Chicago Electric Railway, which is now under construction, will also pass through Gary.

The city will be about square, two miles each way, with ample room on three sides to expand. It has been laid out with the compass, and all streets will run due north and south or east and west. The main north and south thoroughfare will be called Broadway, and it will be 100 ft. wide. The principal east and west street will be Fifth avenue, 80 ft. wide. The intersection of these two streets will be the commercial center of the city, and a great public square will be located there. The finest business blocks will be built around it, together with municipal government buildings and other structures of a public character. Shade trees will be planted and lawns will be laid out around the entire square, and in the center it is planned to erect an ornamental band stand, where open air concerts will be given at frequent intervals. This will be the central recreation ground for citizens during summer evenings. Electric lights will supply illumination, and benches will be placed along the curb, where the people may sit and enjoy the music and rest. A system of small parks and play-grounds for children will be part of the general plans for open-air recreation grounds. Shade trees and lawns will be planted along the curb line in every street. Brick will be the paving material, and all sidewalks are to be concrete.

FEATURES OF THE CITY'S PLAN.

The size of the lots for homes and business blocks has been established by the Gary Land Co. at 25 by 125 ft. for the latter, and 30 by 125 ft. for the former, except in two rows of blocks where the residence lots are to be 30 by 150 ft., on the theory that there will be a class of employes and business men who will want to build more pretentious homes requiring more ground. In the residence districts all alleys are to be 20 ft. wide, and in the business section the alleys will be 30 ft. wide. This unusual alley width has much importance, for in the alleys, instead of in the streets, are to be laid all the service pipes and wires. Sewer, water and gas pipes, together with electric light, telephone and telegraph wires, are to be buried in the alleys, and all manholes and other openings, which are one of the nuisances in most city streets, will be in the alleys. The streets are to be entirely free from all obstructions of this character and in the future, no matter to what size Gary grows, there will arise no necessity for tearing up the street pavements to reach the conduits.

With the complete plan evolved, Gary is to be built from the center outward. Everything that has been done so far has been worked out with an eye to the future. At first, four main sewers are to be laid, of such size as to meet any increased demand that may be made by the expansion of the city. The lateral sewers are to be laid on the same principle. The waterworks and intakes from the lake will be of such capacity as to meet the requirements of a much greater population than Gary is likely to have in a decade. Certain restrictions will surround the sale of lots. These are of a general nature and are the only evidences of control which the Steel Corporation will seek to exercise over the city and its people. Lots will be sold only to bona fide prospective residents, and the element of speculation in them will be eliminated entirely. The company will build houses for sale or rent, or will sell lots for building purposes. There are to be established four or five grades of buildings, and it is proposed not to permit a building of cheaper grade to be erected in a district set aside for buildings of a better class. No residences will be allowed in the business section, and no business houses in the residence section. There will be no attempt to control architectural designs. Every man may build as he chooses so long as his house is up to a general standard. It is not proposed to have any tenements or flats. There will be a wide range in the cost of the various dwellings, but the humblest cottage will have the same sanitary advantages and public conveniences as the more pretentious homes.

POLICY AS TO LIQUOR.

The Steel Corporation will own none of the stores, banks or other public enterprises, but will insist that the men who apply for locations for business purposes shall be of a class that will conduct their business in the proper way. A method will be found to exclude men of questionable business careers.

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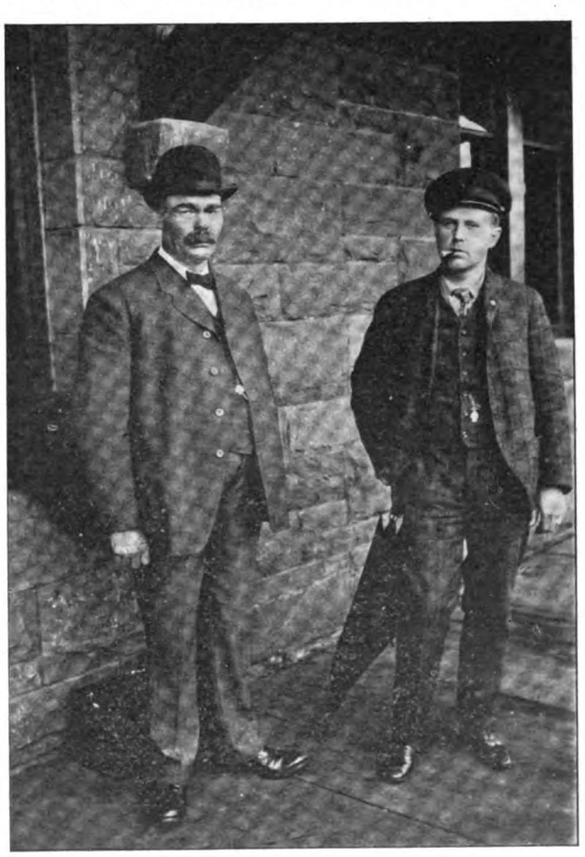
At first it was proposed to insert a clause in all deeds prohibiting the use of the ground for liquor selling purposes, but after mature consideration it was thought that this policy might prove disadvantageous, in view of the fact that a large percentage of the expected inhabitants are foreign born and are accustomed to drinks of an alcoholic nature. The question, however, is yet to be settled, and, merely as an experiment, three or four saloons under the most rigid restrictions will be opened. What the company most desires to produce is a modern city, free from the squalor and poverty of the average iron and steel town, conditions which are largely due to the existence of too many drinking places of a low order. A city is to be built that will invite the highly trained, intelligent class of workmen; a place where men of high or low degree may live, raise and educate their children, accumulate a competence and enjoy all the good things of life as they could in any city in the country. There is no philanthropy in this desire of the Steel Corporation. It is a plain business proposition with it, and one from which it expects to profit by making its employes happy and contented in their home surroundings.

LOSS OF THE STEAMER GRECIAN.

The steamer Grecian, of the Pittsburg Steamship Co.'s fleet foundered in eighteen fathoms of water three miles northwest of Thunder Bay Island light, Lake Huron, on Friday night last. The Grecian had had a mishap a few



CAPT. CLAPP AND ENGINEER ARMSON OF THE GRECIAN.

days previous. In delivering a cargo of coal to Detour she struck a rock, but Capt. Clapp succeeded in getting her in Detour before she settled on the bottom. Her cargo of coal was discharged and temporary repairs were made to the hold. She then started for Detroit to go into dry dock. When off Thunder Bay light about nine o'clock Friday night water began to rush into the hold, caused, it is supposed, by the temporary patch put on her at Detour giving way. When it was seen that the steamer could not be saved, Capt. Clapp instructed the crew to get their personal belongings together and prepare to lower the life boats. Distress signals were meanwhile sounded and the steamer Bessemer of the same fleet, which was feeling her way slowly through the fog, responded. The crew was safely taken on board as the Grecian foundered in eighteen fathoms of water.

The Grecian was one of a fleet of six vessels which was built by the Globe Iron Works, of Cleveland, in 1891 for Ferdinand Schlesinger. They were operated by M. A. Hanna & Co. until the Steel Corporation was formed, when with a number of fleets, they were absorbed by the vessel end of that corporation—the Pittsburg Steamship Co. The Grecian was 296 ft. long, 40 ft. beam and 24 ft. 6 in. deep and was equipped with triple-expansion engines, 24, 38 and 61 in. cylinder diameters by 42-in. stroke, supplied with steam from two Scotch boilers, 14 ft. diameter and 12 ft. 6 in. long.

IMPRESSIONS OF AN EARTHQUAKE.

Editor MARINE REVIEW:—I do not know how to describe the impressions of the earthquake as I never saw nor felt anything like it before. You have crossed shallow lakes or rivers, say like Lake St. Clair or the shallows of Detroit river. Well, if you were in a very long vessel and one of great power and of not over rigid construction, you can imagine the racket there would be if the engineer forgot to slow down where her bottom was almost, or at times, actually in touch with the bottom. Then imagine the helm being put hard over, which would cause the hull to "heel out" from the circular path, and then, when "steadied" to quickly roll back again. You can also imagine the noise the steering rods and chains would make, then imagine some loose hatch bars, buckets and such like things falling about the decks. Then imagine the master shouting and others rushing up from below, half naked, with great shouting and frenzied expression on their faces, due to the imminence of a terrible collision. If you can realize all this and permit your imagination to fill in vacanies due to my imperfect description, you will have some idea of the terror caused by that awful calamity.

To show that this is not an overdrawn picture, I may say that in my little house a piano of 1,000 lbs. weight was thrown from the wall like a basket; pictures and bric-a-brac were thrown about the rooms like pebbles, my book case with hundreds of books was thrown down and smashed to pieces and all covered over by lime and mortar from the walls and ceilings.

I had a barometer of about 15 in. diameter that was thrown out from the wall and returned thereto with its face against the plaster.

I sometimes think that the lower animals know much more than they can express, or than we can understand, and I know there is a mystery about electricity and certain metals and gems, and I can almost imagine my barometer and thermometer as saying "for many years I have told when it was going to rain and when it was going to be fine, when it was going to be hot and when it was going to be cold, but you have provided me with no means to indicate an earthquake, therefore, I resign in infinite disappointment," and it hid its face and its blushes by turning them to the wall.

I think my home was on rocky ground, which did not suffer like those on made or soft ground, therefore, the above description falls far short of the horrors existing in many places. I lived near the rocky shore and on the Rock of Acatraz, for instance, they did not feel the

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earthquake at all, but in the mission and the district south of Market street, whole houses and hotels went down level with the ground and all within them. The city hall also is entirely wrecked by the earthquake—not by the fire or dynamite.

The smaller towns along the Southern Pacific road, as far as San Jose, built on made ground, suffered even worse than San Francisco. Redwood city is almost destroyed. The grand new library of Stanford university is destroyed, the grand arch may never be rebuilt but, above all, the Stanford memorial church—the most beautiful structure I ever beheld—worth probably $2,000,000—is almost in ruins. I saw these things, for I was engaged at the university the day before the earthquake and I have been there since, when I saw the greatest transformation I ever saw until I examined the ruins of San Francisco after the fire.

There I saw, until I was sick of the sight, sixteen square miles of absolute ruin and desolation, where formerly stood the most elegant theatres, the most sumptuous hotels and cafes and perhaps the most pleasure-seeking and mirthful people on earth. I am only afraid that the loss of life was much greater than is commonly stated, where whole buildings went down with all that was in them, and with records and all that was left consumed by the terrible fire, how can the loss of life be known?

A man, who was associated with the coroner's office, told me that they had records over a month ago of 5,872 deaths.

I hope that he was mistaken and I hope that San Francisco, with the finest bay on earth will be rebuilt in greater grandeur than ever, but I know not how these things may be.

JOSEPH R. OLDHAM,
3612 W. Sixty-fifth street, Chicago.

EFFECT UPON SHIP BUILDING.

The MARINE REVIEW recently asked Mr. Harvey D. Goulder, president of the Merchant Marine League of the United States, whether he had ever caused any inquiry to be instituted as to the probable effect of the passage of the shipping bill upon the ship building industry of the country. Mr. Gouder's reply is important as showing the revivifying effect of such legislation upon one of the great industries of the country. He writes:

"Answering your inquiry, I beg to say that we have had in mind conscientiously the question of what favorable results could come from the enactment of the Gallinger shipping bill. Through inquiry, and on investigation, the Merchant Marine League is willing to say that definite, and, in our opinion, conclusive evidence has been furnished to show that, on the ship building industry alone, the effect of the bill will be as follows:

"The immediate placing of orders for about seventy-five steamships, of nearly 400,000 tons gross register. Their advent would increase the efficiency of our present foreign-going shipping fully fifty per cent.

"In further detail, I may say: One large ship yard has inquiries for the construction of about thirty ocean ships, of from 3,500 to 6,000 tons each, aggregating about 140,000 tons gross register. These inquiries are all made because of the prospective passage of the shipping bill of the Merchant Marine Commission.

"Another ship yard has inquiries for four freight and passenger steamers for the South American trade, of about 5,500 tons deadweight capacity, one freight and passenger steamer for Pacific trade of 7,900 tons deadweight capacity, one passenger and freight steamer of a speed of 18 knots and 5,000 tons gross register for West Indian trade, and one tramp freighter of 5,000 tons deadweight capacity, and one tramp freighter of 6,000 tons deadweight capacity.

"Another ship yard has inquiries for vessels to be built if the subsidy bill passes, as follows: One steamer of 7,500 tons gross register, three of 4,000 tons, two of 4,200 tons, four of 3,800 tons, two of 6,300 tons, two of 5,800 tons, and two of 8,000 tons.

"Another ship yard has the offer of a contract to build six freight steamships of 8,000 tons each, if the subsidy bill passes—the plans being prepared and the traffic arrangements to run these ships being in the possession of the owners. This yard is also looking to the building of two more passenger and freight steamers of the auxiliary cruiser class, of about 8,000 tons.

"One steamship company in the Pacific trade proposes to build three steamships of about 12,000 tons gross register if the bill becomes a law. Another steamship company in the Pacific trade announces that it will immediately construct a new steamship of about 8,000 tons gross register if the bill becomes a law—having already prepared the plans and specifications for this vessel. Moreover it is the intention of this company to build two more vessels of like tonnage for the same service.

"A steamship company in the West India trade expects to build without delay two large ships of about 7,000 tons, if the Gallinger bill is enacted, and these exclusive of other tonnage to be built to replace smaller and older vessels just disposed of.

"A firm of New England ship owners has completed plans and specifications for a new and economical type of steel sailing ship of about 6,000 net tons, and is ready to build several such vessels on the passage of the shipping bill.

"This is incomplete, for the reason that it covers work contingent upon the passage of the shipping bill through congress that would be done on the Atlantic coast alone, and, even as regards that coast, only covers what may be termed the leading ship yards. It has no reference to work that would probably be done in wooden ship yards, on the great lakes where vessels for ocean trade up to 260 ft. in length, and of about 2,200 tons gross register, can be locked through to tidewater, and where ships of more than twice that capacity have been carried through in sections and united at tidewater. Nor does the foregoing cover any work in contemplation on the Pacific or Gulf coasts of the United States in the possible contingency of the passage of the shipping bill.

"From this, you will see that the foregoing is a very conservative estimate of the amount of new ship building that will be at once inaugurated in the United States if the shipping bill is passed by congress.

Yours, very truly,
HARVEY D. GOULDER, president.

The Shooter Island Ship Building Co. has leased Shooter island on the Kill Von Kull. The new company is capitalized at $50,000. It is understood that it proposes to make the island the most completely equipped ship yard in the vicinity of New York. It is surrounded by deep water and will have docking facilities for the largest vessels. The directors include Henry P. Davidson, vice president of the First National Bank; E. F. C. Young, president of the First National Bank, of New Jersey; Phillip S. Babcock, vice president of the Colonial Trust Co.; R. C. Benson, vice president of the Tide Water Oil Co.; J. F. Fredericks, cashier of the German National Bank; W. D. Dickey and George B. Case. Mr. Dickey will be the general manager of the ship yard.

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MERCHANT MARINE LEAGUE

The following statement, which may be regarded in the nature of an annual statement has been submitted to the members of the Merchant Marine League by its officers:

TO OUR MEMBERS: The officers of the Merchant Marine League are gratified at the result of the past year's efforts. The success which has attended the movement for the rehabilitation of the merchant marine of the United States in the oversea trade has been due to the work of the League and the inherent strength of the cause.

The officers of the League refer with pardonable pride to the call of its delegation on President Roosevelt and Speaker Cannon a few weeks ago, and to the widespread comment that no more notable delegation ever presented a cause in Washington. On that occasion the League was enabled to have thirty members present, each a representative of a leading industry, and prominent in his community.

What the league has been doing during the year may be illustrated by the fact that last week our bill for postage alone, in distributing literature concerning our merchant marine, was over $100.00. We have entered upon a far-reaching campaign to apprise the public of the actual condition of our merchant marine through the medium of the newspapers of the country. Articles have been sent weekly to over 1,000 newspapers, not especially argumentative in their character, but simply submitting the cold and unvarnished facts. The success of the campaign has been phenomenal. At its beginning ninety out of every one hundred clippings were adverse, today not over twenty-five per cent are adverse, while some of the most powerful newspapers in the country have enlisted in the support of the League. Realizing that such a campaign could not be carried on without earnest and minute attention to details, the League obtained the services of Mr. Alexander R. Smith, who has made the subject a lifelong study. The League was especially fortunate in securing the services of this gentleman. He has done noble work.

The work of the League has been performed in a thoroughly dignified way and placed above politics and partisanship. The League has represented that the restoration of our merchant marine to the oversea trade of the United States is simply a business proposition. It has simply submitted the question to the business sense of the nation as to whether it is not wise to adopt the very means which have proved so successful in upbuilding the merchant marine of other countries and which has enabled foreign vessels to seize ninety per cent of our carrying trade, which has now grown to embrace one-seventh of the entire oversea interchange of the world. Shall we be content to have our oversea trade remain in the hands of our competitors? Such a condition is clearly inimical to the proper development of our foreign markets, since in the manipulation of transportation facilities abroad a foreign ship will naturally favor the dispatch of the products of its own country.

Added to this purely commercial view is the broader question of patriotism. The Naval Board, over the signature of Admiral Dewey, and the Army Board, over the signature of General Chaffee, have both declared the lack of adequate merchant marine to be a serious menace to the national security abroad. This declaration has been supported by Secretary Bonaparte, of the navy department, and Secretary Taft, of the war department, and has met with the unqualified endorsement of the president of the United States.

The League is uncertain whether the shipping bill, which has already passed the Senate, will be passed by the House, or even reported out of the House committee at this session, but there is every fair reason to believe that it will pass and become a law either at this session or at the next session of the present Congress. That this bill will accomplish everything desired, no one has dared to predict, but that it will either do this or at least prove to be a step in the right direction, we believe is beyond dispute.

The League might have had a great many more members had its officers devoted their attention to increasing its number rather than to the direct work for which it was organized. Appreciating in the fullest degree the influence and support which we have mutually given to each other in this movement, the League deems it necessary to ask your support for another year.

JOHN A. PENTON, Secretary. HARVEY D. GOULDER, President.

AROUND THE GREAT LAKES.

The steamer Gladstone of the Bradley fleet is reported ashore on Pilot island at Death's Door entrance, Green Bay, one of the most dangerous spots on Lake Michigan.

Capt. Joseph Oliver, of Muskegon, has been given the contract for raising the sunken steamer Carrie Ryerson which sank as a result of the collision with the Goodrich liner Georgia.

The steamer Crescent City, of the Pittsburg Steamship Co.'s fleet which went ashore near Two Harbors in the great storm on Lake Superior last November is now in dry dock at Lorain.

Capt. C. A. Anderson, of the steamer Centurion, reports passing through ten miles of shell ice Monday night about ten miles westward of Grand island on the course from Point Sable to Marquette.

The new steamer Ogdensburg, of the Rutland line, built at the Cleveland yard of the American Ship Building Co., passed through the locks of the Welland canal on her maiden trip this week.

John Churchill, of Buffalo, has been appointed chief engineer of the steamer Lyman C. Smith to succeed George M. Milne who has accepted the position of assistant inspector of boilers at Detroit.

The steel steamer Angeline, owned by the Cleveland Cliffs Iron Co., ran hard aground during the fog Sunday night just off Point Abino. It was necessary to lighter about 100 tons of her cargo of ore.

Every watchman, wheelman, mate and master on the lakes should read Clarence E. Long's article on "Scientific Lake Navigation" now running in the MARINE REVIEW. This series began in the issue of April 5. To anyone sending in his subscription now all the back numbers will be sent to him free—that is to say his subscription will be entered for one full year from the date of receipt and all the back numbers allowed without charge.

At the time of the disaster of April 18, the giant shears which had been in use at the Union Iron Works for years were practically wrecked. The violent shock threw them down with great damage. They fell athwart the steamship City of Pueblo cutting that vessel's steel hull almost down to the water line and sinking that craft in very shallow water. New shears are now in course of construction, which will be of even greater capacity, and of more modern type than the old ones. With the completion of the big shears, and the extensive repairing of damages to the dry dock, the Union Iron Work's plant will be in as good general operating condition as before the big shakeup.

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SCIENTIFIC LAKE NAVIGATION

By Clarence E. Long

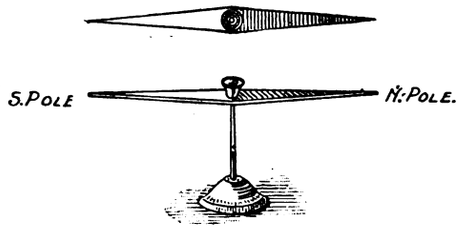
THE MARINER'S COMPASS.

With Full Details as to Its Operation, Construction, Systems of Notation.

LESSON II.

The mariner's compass is simply an instrument that utilizes the directive or pointing power of the magnet. Any magnetized piece of tempered steel, permitted to turn at its center of gravity (poised so that it will balance), and left to the influence of the earth's magnetism, will, by magnetic attraction, point to a definite direction, known as magnetic north and south, and, from this direction all other directions, by means of the compass card attached to this magnetized piece of steel, are taken and a ship guided on any desired course.

This means that if any magnetic needle be hung at its center by a thread, so that it will balance, or poised on a pivotal bearing at its center of gravity, so as to move freely in a horizontal plane (on a level with the horizon), it will at first move to and fro (by attraction and being disturbed from its natural position in the magnetic meridian but will eventually come to rest (by this same attraction) in a north and south line. This line or direction, is what is called the magnetic meridian, since it is in the direction of the magnetic north pole, which varies with the true



Showing a magnetic needle off and on its support, or pivotal bearing. The shaded portion is north magnetism or the north pole, and the light portion is south magnetism or the south pole.

meridian or the direction of the true pole, at different places on the earth's surface. The angle this magnetic meridian (pointed out by this piece of magnetized steel at any place, or by the north and south points of any compass card) is called the variation of the compass, which will be fully explained in another lesson.

The working principle of the compass is simply the poising of the magnetized needle of steel, so that by being permitted to turn on its axis freely, it is controlled by the earth's magnetism and kept pointing constantly in one direction. This is practically all there is to its principle. The simple law of nature that is responsible for its power of direction, is the law of magnetism. The earth itself is supposed to be a great natural magnet, and the attractive influence of its magnetic poles, which are situated some distance from the geographical poles, are supposed to give direction to the magnetic needle.

The first fundamental law or principle of magnetism is attraction and repulsion of magnetic poles. Like poles repel each other and unlike poles attract each other. When the like or same poles of two magnets (when one or both of the magnets are suspended or poised, as the magnet of the compass) will repel or drive each other away when brought near to each other; that is, of like name, or magnetically of the same kind, as two north or two south poles. The unlike poles of any two magnets, under the same conditions, will attract each other, as the north pole of a magnet will attract the south pole of another magnet, and vice versa Whenever attraction takes place magnetically the forces must be opposite in name. The constant pointing of the magnetic needle to the north magnetic pole of the earth depends on the two kinds of magnetism of which each is composed, one is of the south kind and the other of the north kind. The magnetism of the north magnetic pole is composed of the south kind, and the north end of the compass needle, or other magnet bar, of the north kind; hence, being magnetically opposite, attraction is the result.

The mariner's compass, although simple from a mathematical point of view, is wonderful as a phenomena. Let us understand that it consists only of a magnetized flat bar or needle of steel riveted to a circular card on which 32 equal lines are shown radiating from the center and indicating the various compass points of the horizon. This magnet with the card attached is balanced on a sharp, steel point and rests in a horizontal position, preserving the same when the vessel pitches and rolls, and being poised to turn freely, it always points out the magnetic cardinal directions, provided that disturbing influences in the way of iron and steel are not brought in near proximity to it. In other words, the compass card will remain fixed while the vessel revolves beneath it.

The earth is a huge magnet and has a north and south magnetic pole. An iron bar acquires polarity by magnetism, and when freely suspended from its center of gravity (either by a thread or by being poised on a sharp point) it will arrange itself in the magnetic meridian and point to the magnetic poles of the earth. These magnetic poles are respectively the points on the earth toward which the magnetic needle itself, or where it may, for the better understanding of the subject, be considered that the intensity of the magnetic force is a maximum.

The earth being a magnet its magnetism has the same properties that the magnet of the compass has. It has a north and south magnetic pole, and its laws and principles are similar to the magnet of the compass.

Every magnet has two distinct poles of different magnetism, or polarity. One of them is called a north pole and the other a south pole; that is, the magnetism is of two varieties, the north kind and the south kind, or magnetically opposite to each other. The earth being a magnet has a north magnetic pole and a south magnetic pole; these are distinct from the true poles at the end of the earth's axis. The north magnetic pole is situated some 1,200 miles south of the true north pole of the earth, and the south magnetic pole is some 900 miles north of the earth's true south pole. You will notice from this that these two magnetic poles are not diametrically opposite to each other, as are the true poles of the earth. The magnet (bundles of magnetized steel wires) in every compass has a north pole and a south pole, or it is composed of north magnetism and south magnetism. Now, every magnet has what is called an equator, or neutral line, and this line is located about midway between the two poles, or ends of the magnet. It is also called the dividing, or separating line, that is, it separates the two kinds of polarity, or magnetism, from each other. It is also called the point of magnetic indifference, meaning

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the point where there is no effect produced. Now, at this neutral line, or equator, there is no magnetic effect, but from there outward toward the two poles it gradually increases, and is greatest at the poles or ends of the magnet. All magnets are alike in this respect.

To distinguish the magnetic poles from each other, the north pole of a magnet is painted red and called north, or red polarity; and the south pole of a magnet is painted blue and called south, or blue polarity. Two red poles (i. e., two separate magnets, one or both being poised) then, presented to each other would cause a repulsion; but a red and a blue, under the same conditions, would cause an attraction. The latter case applies to the manner in which the compass needle is attracted toward the magnetic poles of the earth.

Now, if the north point of a compass needle points north, and we know that it does, and is attracted towards the north by the magnetism in the north magnetic pole of the earth, then the magnetism residing in the magnetic pole must contain south, or blue polarity, otherwise, attraction could not take place. This does not seem reasonable at first thought, but, nevertheless, it is a truth. All that you have to do is to remember the rules that like poles repel and unlike magnetic poles attract one another. The compass needle gets its directive force from the two magnetic poles of the earth, and are consequently attracted by the magnetism residing at these points. The south magnetic pole must then contain north, or red polarity, and so it does. That then, is the reason for the compass pointing north; or you may say the same thing of south. The compass needle also points south, and it gets its directive force from the magnetism residing in the south magnetic pole, which is of an opposite name.

The north pole of the earth's magnetism attracts the north end of the compass needle, and the south pole of the earth's magnetism attracts the south end of the compass needle, and that is from whence the needle gets its directive power. This is not precisely the truth, but it will suffice for the present.

There are a great many practical men who imagine that the compass needle has more magnetism in the north end than in the south end, and assign this as a reason for it pointing north. This is not true, as you are in a position to know differently by what you have already learned. Others again think that when you cross the equator of the earth, that in order to go south, you have to steer north by compass, and vice versa. There isn't any sense to such talk as this. The compass needle always points to the magnetic poles of the earth—north on the compass pointing to the north magnetic pole of the earth's magnetism, and south on the compass to the earth's south magnetic pole—no matter at what part of the earth we are located. This is in the direction of the magnetic meridian, or the needle coincides with that meridian.

The origin of the compass is very obscure. The ancients were aware that the loadstone attracted iron, but were ignorant of its directing property. The instrument came into use in Europe sometime in the course of the 13th century. Loadstone is the natural magnet, having the same properties as the artificial magnet. It is closely related to ore of iron, and is of a dark gray color. It is found in all parts of the world.

To go on with the compass. The compass is the instrument by which we determine in which direction the ship is sailing, and as it is said, dates back to nearly 2,000 B. C., the Chinese claiming the distinction of having first discovered its use.

On board ship the compass is set in a case known as a binnacle. Binnacles are of various patterns. The binnacle is usually made of brass, or of some other non-magnetic material, so that it will not affect the needles of the compass. The binnacle consists of two principal parts—the bowl and the cap, or hood. The bowl is the lower part in which the compass hangs. The hood is the upper part, which can be removed when it is necessary to get at the compass. On that side of the hood which faces the steersman is an oval opening fitted with glass through which the man at the wheel can see the compass. In each side of the cap, or hood, is a lantern, the chimney of which protrudes above, and which illuminates the compass at night.

The compass consists of three principal parts—the bowl, the card and the needles, which are the mechanical and mathematical arrangements of this most wonderful but minute instrument. The bowl of the compass is made of brass, as well as everything that goes with it, except the needles, and it is swung in gimbals—pairs of brass hoops which swing one within the other on diameters at right angles to each other. These gimbals preserve the horizontal position of the compass when the vessel rolls or pitches in a seaway. The compass card revolves on a pivot which rises from the bottom of the bowl, and terminates in a sharp point of some very hard substance, such as iridium and bell metal. Iridium is the hardest metal known. On the underside of the card is fixed what is called the magnetic needle or needles (some have more than one, in fact all late makes of compasses have from 4 to 8 bundles of needles laid side by side, or parallel to one another and at different chords from north and south) which are of steel and highly magnetized. The magnetized steel, as we have already seen, has a tendency to point toward the magnetic poles of the earth and being balanced on the pivot before mentioned it endeavors to preserve its direction, no matter which way the bowl of the compass is turned by an alteration of the direction of the ship's head. In the center of the card is a small cap, or jewel, hollow on the under side which sets over the pivot, permitting the needle or card, to revolve (or appear to revolve, for it is the vessel which moves) freely when the vessel's course is changed.

There are two principal kinds of compasses, the liquid and the "dry." In the liquid compass the card is almost floated in diluted spirits of wine, which will not freeze in extremely cold weather. The flotation is so adjusted that the card exerts just a trifling downward pressure on the pivot. Of course, the compass bowl is sealed hermetically, so that the spirits cannot escape, and in the finer kinds, such as the Ritchie compass, which is used exclusively by the United States navy, there is a self-adjusting expansion chamber, by which the bowl is constantly kept filled. The objects of this form of compass are first to diminish the friction due to the weight of the card on the pivot, thereby materially increasing its sensitiveness (readiness of movement); and secondly, to render the compass steady in heavy weather, or when placed in position where there is much tremor arising from machinery or otherwise. The flotation power of the card is so adjusted that though the latter is several ounces in weight, its pressure on the point of support, (the pivot), does not exceed fifteen or twenty grains. The bowl should be so completely filled with the spirits as to leave no air-bubble. If one should at any time appear, the bowl must be unshipped and turned upside down to permit of the deficiency being made good through the proper filling hole—on the side, near the top—which is then closed by a screw cap and washer. In the spirit compass a washer of gum rubber

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is used, and in an oil compass, a lead washer is used. On no account must the glass cover ever be started for filling purposes, or for any other purpose unless you know what you are doing it for. In hot latitudes the compass should be shielded from the rays of the sun which will turn the card a dirty brown, if not crack the glass top.

The compass is employed, or used, in various ways, but the compass intended for use on board ship is called the mariner's compass, and according to the purpose it is intended for it is named the steering compass, the standard compass, the azimuth compass, etc.

The mariner's compass consists of a circular card, which represents the horizon of the observer; the circumference being divided according to two systems of notation—into points and degrees—32 points and 360 degrees.

Reading the Compass by Points.—It is now necessary to consider the information contained on the compass card. There is a great deal more there than you think for. But few navigators are, what you can say, thoroughly familiar with the "sea clock," as sailors call the compass. Let us say right here, that there is not bestowed on the compass the amount of consideration that it merits. It is pre-eminently the instrument upon which the safety of the vessel depends, and justly ranks first in importance. It would be a much easier matter to dispense with the chronometer, or even the sextant, than with this invaluable guide.

As the student of the compass has already learned, the compass card is divided into 32 equal parts, called points, or directions, and each part, therefore, is one point, or the 32nd part of a circumference, and is equal to 11¼ degrees, or 11° 15′.

REGARDING MAGNETIC BEARINGS.

Capt. M. A. Boggan,

Master Steamer Conemaugh:—

What you say in regard to magnetic bearings is only too true, as the magnetic bearing of Corunna range shows. Correct magnetic bearings, as given in various publications, including those issued by the government, should be regarded as suspicious on this account, or until verified and found correct. They may have been the correct thing one time, but as the variation changes and the amount is not taken into account and goes uncorrected after a number of years they cannot help being incorrect. As recent observations are continually finding a different amount of variation from that given on some charts found from observations taken years ago and kept corrected by allowing for the annual increase or decrease, it is only too apparent that this matter should always be looked into. A knowledge of navigation gives the master of a vessel confidence and a feeling of self-assurance in his work, since it makes him independent, in a large measure, of corrected courses, etc., given in publications of this nature. A navigator of ability does not require dry nursing of this kind since he is acquainted with the necessary data to make the deductions himself. All late charts keep him posted of new observations for variation and such other information that he can turn to good use. So long as it becomes necessary to make his own corrections for variations, corrected course of this kind are of no real benefit to the man who knows how the operation is performed and can do it himself.

LONG.

Contract has been awarded the Wellman-Seaver-Morgan Co., of Cleveland, for the installation of five Hulett ore unloading machines at the Indiana Steel Co.'s plant at Gary.

EXPLOSION ON BOARD SHIP AT LIVERPOOL.

Nine men were killed and about forty injured as the result of a terrific explosion at Liverpool on board the British steamer Haverford of the International Navigation Co. The vessel, which is commanded by Capt. Nielsen, arrived at Liverpool from Philadelphia, landed her passengers, and proceeded to Huskisson dock, in order to unload. The stevedores were loosening the hatches when the explosion occurred. It blew off the hatches, rent the decks, and hurled dead and wounded men in all directions. The explosion, which was heard for many miles, was followed by an outbreak of fire. The cargo, consisting of linseed oilcake, in hold two and hold three, was soon blazing fiercely. Firemen and police hurried to the scene, and the injured were quickly taken to a neighboring hospital, while the work of searching for further possible casualties proceeded with vigor, in spite of the fierceness of the fire which soon assumed alarming proportions, owing to the inflammable nature of the cargo. After two hours' hard fight, however, the firemen obtained the mastery of the flames. The cause of the explosion is now being inquired into.

ITEMS OF GENERAL INTEREST.

The wharf of the Merchants & Miners' Transportation Co., at Baltimore, was totally destroyed by fire recently. The steamer Essex lying alongside was burned to the water's edge, as were also eight scows and barges. The loss is estimated as over $1,000,000.

The Old Dominion Steamship Co., of New York, has concluded negotiations for the purchase of a majority stock of the Virginia Navigation Co., and Mr. W. L. Guillaudeu, president of the Old Dominion line, has also been elected president of the Virginia Navigation Co.

The Bath Iron Works, Bath, Me., has been awarded contract by the Eastern Steamship Co. for a new passenger steamer somewhat on the same line as the steamer City of Lowell. The new steamer will be 335 ft. long, 40 ft. beam and 17 ft. deep. She will have turbine engines and Scotch boilers.

It is announced that the seven-masted schooner Thomas W. Lawson and the six-masted schooner Wm. L. Douglass have been chartered to carry oil from the Texas fields to northern refiners. This is the first time schooners have been utilized for this purpose, though full-rigged sailing ships have carried oil abroad.

Every watchman, wheelman, mate and master on the lakes should read Clarence E. Long's article on "Scientific Lake Navigation" now running in the MARINE REVIEW. This series began in the issue of April 5. To anyone sending in his subscription now all the back numbers will be sent to him free—that is to say his subscription will be entered for one full year from the date of receipt and all the back numbers allowed without charge.

The second of the three tugs building for the Pennsylvania railroad at the yard of the Maryland Steel Co., Sparrow's Point, Md., was launched recently. The tug is 105 ft. over all, 91 ft. 3 in. keel, 24 ft. beam and 13½ ft. deep. She is fitted with one compound engine with cylinders 18 and 36 in. by 26-in. stroke. Steam will be supplied by a Scotch boiler 14 ft. 5 in. by 12 ft. 8 in., allowed 160 lbs. pressure. In addition to these orders the Maryland Steel Co. is building two car floats 340 ft. long for the New York, Norfolk & Philadelphia Railroad Co., two oil barges for the Standard Oil Co., each 185 ft. long, a freight steamer 235 ft. long for the Old Bay line and a passenger steamer 275 ft. long for the Baltimore & Philadelphia Steamboat Co.

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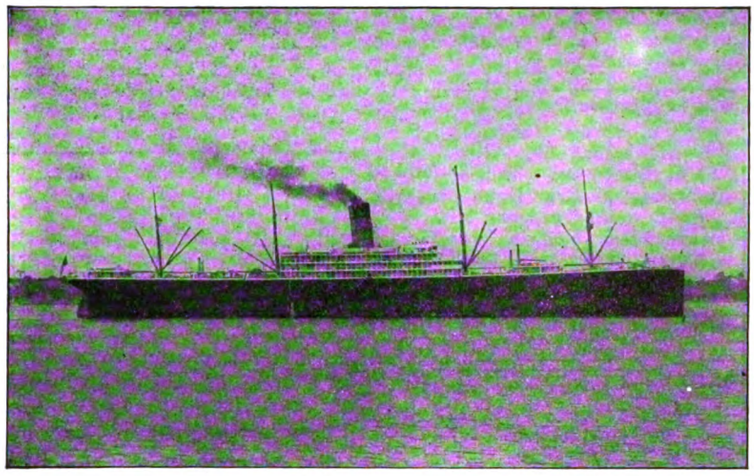

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WANTED and FOR SALE Department.

PROPOSALS.

U. S. Engineer Office, Jones Building, Detroit, Mich., June 4, 1906. Sealed proposals for widening St. Marys' Falls Canal will be received at this office until 2 p. m., July 24, 1906, and then publicly opened. Information furnished on application. Chas. E. L. B. Davis, Col. Engrs.

U. S Engineer Office, Room 508, Federal Bldg., Chicago, Ill., May 26, 1906. Sealed proposals for concrete superstructure in Chicago Harbor, Ill., will be received here until noon, June 30, 1906, and then publicly opened Information on application. W. H BIXBY, Lt. Col., Engrs.

U. S. Engineer Office, Milwaukee, Wis., June 1, 1906. Sealed proposals for building crib extensions of 100 feet each to breakwaters at Sheboygan and Kenosha Harbors, Wisconsin, will be received here until 3 P. M., standard time, June 27, 1906, and then publicly opened. Information furnished on application. W. V. Judson, Maior, Engrs.

U. S. Engineer Office, Jones Building, Detroit, Mich., June 11, 1906. Sealed proposals for dredging Shoal 28 in Mud Lake, St. Mary's River, Mich., will be received at this office until 2 p. m. July 11, 1906, and then publicly opened. Information furnished on application. Chas. E. L. B. Davis, Col. Engineers.

SEALED PROPOSALS will be received at the office of the Light-House Board, Washington, D. C., until 2 o'clock P. M. July 17th, 1906, and then opened, for furnishing the materials and labor of all kinds necessary for the construction and delivery of the single-screw steel steam light-house tender Anemone.

WANTED.—Master Shipfitter (outside), $6.00 per diem. A competitive examination will be held for the above position July 12, 1906. For further information address "Commandant, Navy Yard, Portsmouth, N. H."

FOR SALE.

Diving Suit.

FOR SALE.—Diving Suit, Pump and complete outfit, used but once, good as new; a bargain. E. L. Strong, 112 Superior St., Cleveland, O.

For Sale or Charter for the Season.

Commodious Steam Yacht, 75 ft. long, 18 ft. beam, 6½ depth of hold. Two staterooms and finest outfit, including electric light plant, search light, and power launch. Triple expansion engine, safety boiler. Cheap and easy steamer. Inquire of R. J. Cram, Port Huron, Mich.

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1,000 h. p. fore and aft Neafie & Levy compound Engine; surface condenser; independent pumps.
Two 12-foot Scotch Boilers.
One 13½-foot Scotch Boiler.
One 10 16-25 x 16 triple expansion Engine.
Three 150-h. p. Almy Boilers.
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One 14 30 x 24 fore and aft Engine and condenser.
One Williamson steering Engine.
One 10 k. w. electric lighting Set.
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One Providence Windlass, 50 fathoms 1½ in. chain.
Two thrust Shafts and Bearings, 8½ in. diameter.

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Steamer E. F. Gould, length 137 ft., width 28 ft, depth 8 ft. 5 in, tonnage 261 tons. Boiler, engine and hull in good condition. First-class, complete sand pumping outfit now installed on boat, will sell with boat if so desired. Apply

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FOR SALE.—At a bargain, side-wheel transfer boat Delta; 226 x 45½ feet — 231 x 74 feet over all—7 feet deep. Ainslee-Cochran engines, 23¾ x 7 feet stroke, 12 foot bucket, 2 doctor pumps, 2 donkey pumps, double engine capstan 6 x 14 inches. Machinery as good as new; 4 boilers, 44 inches by 26 feet, allowed 156 pounds steam. Will sell altogether or separately. Address W. J. Kelleher, Q. & C. R. R. Co., New Orleans, La.

Steamer T. S. Christie.

Length 160 ft.; beam 30 ft.; carrying capacity, lumber 525,000 ft., coal 800 tons. Rating in Inland Lloyds Register, A-½*, valuation $22,000. For price and particulars address Capt. P. Larsen, care Francis Beidler & Co., Loomis & 22nd Sts., Chicago, Ill.

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Five Scotch Boilers, allowed 160 lbs, steam. Good as new. ERIE MACHINERY CO., 729 Garfield Bldg., Cleveland, O.

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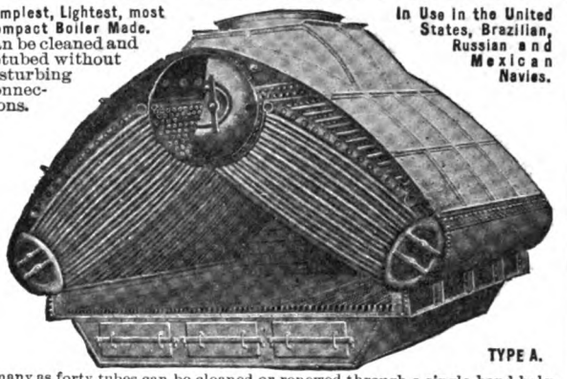

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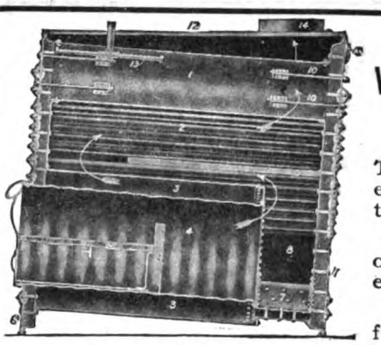


Detroit Scotch Water Tube Boiler

Internally Fired.

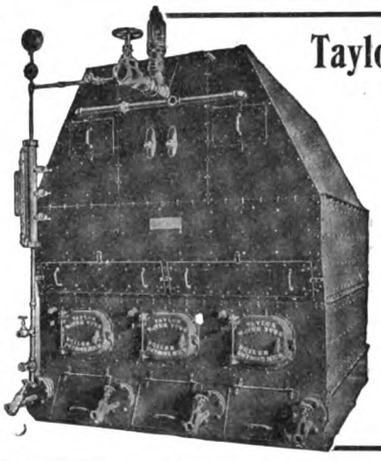
Scotch and Water Tube types combined, eliminating all objections.

Half the weight of ordinary Scotch boilers.

Standard corrugated furnaces.

Patent applied for. Investigate before buying any other.

EAST END BOILER WORKS
Detroit, Mich.

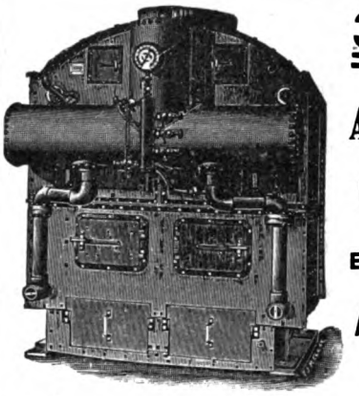


Taylor Water Tube Boiler Co.

Vertical Tubes, sectional, large steam space and liberating area.
Fire box, combustion chamber, and course for the furnace gases similar to the Scotch Marine.
Free circulation type.

Send for full description.

322 Franklin St.
DETROIT, MICH



350 STEAM VESSELS

Now Equipped With

ALMY'S PATENT SECTIONAL Water Tube Boilers

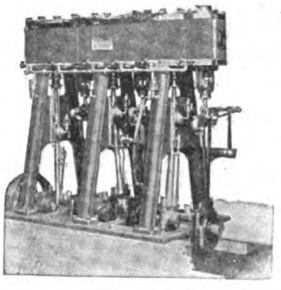
Bear Evidence of Their

Excellent Qualities

ALMY WATER-TUBE BOILER CO.
PROVIDENCE, R. I.

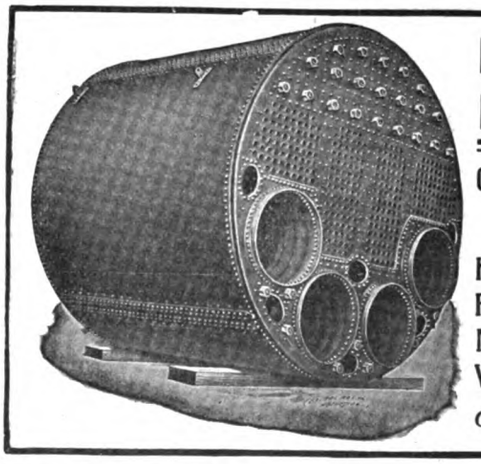
John E. Thropp & Sons Co.

TRENTON, N. J.



Builders of Single, Compound, Triple-Expansion and Direct Connected Engines.

Boyer Sectional Water Tube boilers and Machinery complete for light draft Passenger Boats, Yachts, Tugs, Etc.



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OF ALL TYPES

KINGSFORD FOUNDRY & MACHINE WORKS,
Oswego, N.Y.

LATEST PATENT ANCHOR

THE NATIONAL

APPROVED BY LLOYDS.

Manufactured by

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Catalogue on Application.

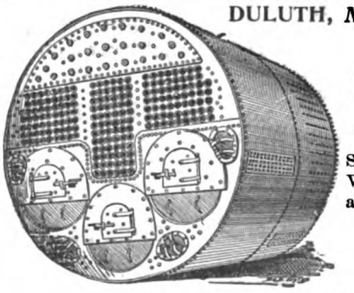
The National and International ANCHORS.

Furnished to the Lake Trade by

The Upson-Walton Co.,
CLEVELAND, O.

Northwestern Steam Boiler & Mfg. Co.

DULUTH, MINN.



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For a more complete classification than that represented by advertisers in The Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, Marine and Naval Directory of the United States, published by The Marine Review, Cleveland.

[See accompanying Index of Advertisers for full addresses of concerns in this Directory.]

AIR COMPRESSION, HOISTS, ETC.
Great Lakes Engineering Works....Detroit.

AIR PORTS, DEAD LIGHTS, ETC.
Marine Mfg. & Supply Co.....New York.

AIR PUMPS AND APPLIANCES.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works....Detroit.

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Bowers, L. M. & Co.....Binghamton, N. Y.

ANTI-FRICTION METALS.
Cramp, Wm. & Sons....Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.
American Ship Building Co.....Cleveland.
Detroit Ship Building Co....Detroit.
Great Lakes Engineering Works....Detroit.

ASH EJECTORS.
Great Lakes Engineering Works....Detroit.

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Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley....Cleveland.
Jenkins, Russell & Eichelberger....Cleveland.
Kremer, C. E. .....Chicago.
MacDonald, Ray G.....Chicago.
Shaw, Warren, Cady & Oakes.....Detroit.
White, Johnson, McCaslin & Cannon.....Cleveland.

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Ritchie, E. S. & Sons.....Brookline, Mass.

BELTING (LEATHER.)
Republic Belting & Supply Co.....Cleveland.

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BOAT BUILDERS.
Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Marine Construction & D. D. Co....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.

BOILER COMPOUNDS.
The Bird-Archer Co.....New York
Dearborn Drug & Chemical Works.....Chicago.
State Manufacturing Co...Cleveland.

BOILER MANUFACTURERS.
Almy Water Tube Boiler Co.....Providence, R. I.

BOILER MANUFACTURERS—Continued.
American Ship Building Co.....Cleveland.
Atlantic Works..East Boston, Mass.
Chicago Ship Building Co..Chicago.
Cramp, Wm. & Sons..Philadelphia.
Dearing Water Tube Boiler Co....Detroit.
Detroit Ship Building Co....Detroit.
East End Boiler Works....Detroit.
Fletcher, W. A. & Co.....Hoboken, N. J.
Fore River Shipbuilding Co.....Quincy, Mass.
Great Lakes Engineering Works....Detroit.
Kingston Foundry & Machine Works .....Oswego, N. Y.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Mosher Water Tube Co..New York.
Newport News Ship Building Co..Newport News, Va.
New York Shipbuilding Co.....Camden, N. J.
Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.
Quintard Iron Works Co.....New York.
Roberts Safety Water Tube Boiler Co. .....New York.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co....Detroit.

BOILER RIVETS.
Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.
Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

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Cramp, Wm. & Sons....Philidelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works..Detroit.
Lunkenheimer Co.....Cincinnati.

BRIDGES, BUILDERS OF.
Scherzer Rolling Lift Bridge Co....Chicago.

BUCKETS, ORE AND COAL.
Brown Hoisting & Conveying Machine Co..... Cleveland.

CABIN AND CABINET FINISHING WOODS.
Martin-Barriss Co.....Cleveland.

CANVAS SPECIALTIES.
Baker & Co., H. H.....Buffalo.
Bunker, E. A.....New York.
Upson-Walton Co.....Cleveland.
Republic Belting & Supply Co....Cleveland.

CAPSTANS.
American Ship Windlass Co.....Providence, R. I.
Dake Engine Co.....Grand Haven, Mich.
Hyde Windlass Co.....Bath, Me.
Marine Mfg. & Supply Co.....New York.

CEMENT, IRON FOR REPAIRING LEAKS.
Smooth-On Mfg. Co.....Jersey City, N. J.

CHAIN SURVEYORS, HOISTS.
Brown-Hoisting Machinery Co.....Cleveland.
General Electric Co.....Schenectady, N. Y.

CHAIN HOISTS.
Boston & Lockport Block Co.....Boston, Mass.
Republic Belting & Supply Co.....Cleveland, O.

CHARTS.
CLOCKS (Marine and Ship's Bell)
Penton Publishing Co....Cleveland.

AND CHRONOMETERS.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.
Hanna, M. A. & Co.....Cleveland.
Pickands, Mather & Co....Cleveland.
Pittsburg Coal Co.....Cleveland

COAL AND ORE HANDLING MACHINERY.
Brown-Hoisting Machinery Co.....Cleveland.

COMPASSES.
Ritchie, E. S. & Son.....Brookline, Mass.

CONDENSERS.
Great Lakes Engineering Works....Detroit.
Thropp & Sons Co., John E.....Trenton, N. J.
Wheeler Condenser & Engineering Co.....New York.

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Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co....Buffalo.
Graves & Stephens .....Cleveland.
Great Lakes Dredge & Dock Co....Chicago.
Hickler Bros.....Sault Ste. Marie, Mich.
Hubbell Co., H. W..Saginaw, Mich.
Smith Co., L. P. & J. A...Cleveland.
Starke Dredge & Dock Co., C. H...Milwaukee.
Standard Contracting Co..Cleveland.
Sullivan, M.....Detroit.

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Upson-Walton Co.....Cleveland.

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TOLEDO, OHIO.

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Derrick Scows
Pile Drivers
Lighters
Concrete Plants

Commercial Bank Bldg. CLEVELAND, O.

Buffalo Dredging Co.

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ON
SUBMARINE WORK

Office
D. S. Morgan Bldg. BUFFALO, N. Y.

GREAT LAKES DREDGE & DOCK CO.

OWNS AND OPERATES THE PLANTS OF THE FORMER COMPANIES:

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Hausler & Lutz Co.
Green's Dredging Co.
Chicago Star Con. & D. Co.
McMahon & Montgomery Co.
Chicago Dredging & Dock Co.
Griffith, McDermott & Watt Dredging Co.
Duluth Dredge & Dock Co.
Lake Superior Contracting & Dredging Co.

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RIVER AND HARBOR IMPROVEMENTS.
Main Office: 1319-1322 Chamber of Commerce - CHICAGO

DUNBAR & SULLIVAN DREDGING CO.
BUFFALO, N. Y.

Ready for Spring A New Tool

A REVOLVING CLAMSHELL DREDGE

which will do the following impossibilities to the ordinary dredge:

Excavate 60′ back from face of dock into scow or vice versa. Excavate at either end of itself and dump in scow at other end. This makes through cutting and cleaning narrow slips cheaply possible. Excavate trenches to 150′ or more depth. Excavate material and throw it one side 150′ from original site where there is four feet of water between dump and channel. Excavate shallow channels down to 4′ x 44′. Clean out boulders or obstructions without disturbing surrounding bottom Excavate close to docks without injury to dock. Anything that ordinary derrick will do up to 10 tons at 75′ radius.

This is an excellent wrecking tool.

Hickler Brothers

SAULT STE. MARIE, MICH.

MARINE RAILWAY

Capacity, 1,000 tons. Draft, 7½ ft. forward, 13½ ft. aft. Length on keel blocks, 180 ft.; over all, 190 ft.

Machine Shop, Foundry and Steam Forge, Dredges, Drill Boats and Derrick Scows.

Steamboat Fuel at Ashtabula.

Large Supplies of Best Quality.

Lighter Carrying Different Grades at all Times.

Fuel Scow with elevators and discharging spouts. Storage of 800 tons. Discharges 250 tons an hour into steamers while unloading cargo.

M. A. Hanna & Co., Miners and Shippers,
Main Office, Perry-Payne Bldg., Cleveland.

H. W. HUBBELL CO.

Submarine Work
of all kinds

Dredging Hard Material a Specialty.

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Kahnweiler's Sons, D....New York.

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Brown-Hoisting Machinery Co.....
.... Cleveland.

DIVING APPARATUS.
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Schrader's Son, Inc., A..New York.

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Buffalo Dredging Co.....Buffalo.
Dunbar & Sullivan Dredging Co....
.... Buffalo.
Great Lakes Dredge & Dock Co..
.... Chicago.
Hickler Bros. .....
.....Sault Ste. Marie, Mich.
Hubbell Co., H. W..Saginaw, Mich.
Smith Co., L. P. & J. A...Cleveland.
Starke Dredge & Dock Co., C. H...
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Sullivan, M..... Detroit.

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Buffalo Dry Dock Co.....Buffalo.
Chicago Ship Building Co.....
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Detroit Ship Building Co.....
.... Detroit
Great Lakes Engineering Works....
.... Detroit.
Lockwood Mfg. Co.....
.....East Boston, Mass.
Milwaukee Dry Dock Co.....
....Milwaukee.
Newport News Ship Building Co...
.....Newport News, Va.
Shipowners' Dry Dock Co.Chicago.
Superior Ship Building Co.....
.... Superior, Wis.
Tietjen & Lang Dry Dock Co.....
..... Hoboken, N. J.

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Thropp & Sons, John E.....
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Fore River Shipbuilding Co.....
..... Quincy, Mass.

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Hall Bros. ..... Philadelphia.
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.....Sparrows Point, Md.
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.....Newport News, Va.
New York Ship Building Co.....
.....Camden, N. J.
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Co. ..... Duluth, Mich.
Quintard Iron Works Co., New York.
Roach's Ship Yard.....Chester, Pa.
Sheriffs Mfg. Co.....Milwaukee.
Superior Ship Building Co.....
..... Superior, Wis.
Thropp, J. E. & Sons Co.....
.....Trenton, N. J.
Trout, H. G.....Buffalo.

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Northwestern Steam Boiler & Mfg.
Co. ..... Duluth, Minn.

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Pickands, Mather & Co., Cleveland.
Pittsburg Coal Co.....Cleveland.
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Safety Car Heating & Lighting Co..
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Chase Machine Co.....Cleveland.

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Brown Hoisting Machinery Co.....
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Chase Machine Co.....Cleveland.
Dake Engine Co.....
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General Electric Co.....New York.
Hyde Windlass Co.....Bath, Me.
Marine Iron Co.....Bay City.

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.....Cuyahoga Falls, O.

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Watson-Stillman Co., The.....
..... New York.

ICE MACHINERY.
Great Lakes Engineering Works....
..... Detroit.
Roelker, H. B.....New York.

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American Injector Co.....Detroit.
Jenkins Bros.....New York.
Lunkenheimer Co. ..... Cincinnati.
Penberthy Injector Co.....
..... Detroit, Mich.

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Gilchrist & Co., C. P.....Cleveland.
Hawgood & Co., W. A., Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co.....Cleveland.
McCarthy, T. R.....Montreal.
McCurdy, Geo. L.....Chicago.
Mitchell & Co.....Cleveland.
Parker Bros. Co., Ltd.....Detroit.
Peck, Chas. E. & W. F.....
.....New York and Chicago.
Prindiville & Co.....Chicago.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.

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